ZERO
MOTORCYCLES®



2013-2023 S, SR, DS, DSR
SERVICE MANUAL

100%
ELECTRIC

CRAFTED IN
CALIFORNIA

8811965-AD

EMEA (Europe, Middle East, Africa) Disclaimer

This Service Manual has been drawn up by Zero Motorcycles Inc. and is intended for and addressed to technicians authorized by Zero Motorcycles to provide services or to other independent operators that are (in)directly involved and in the repair or maintenance of vehicles, who are in any case properly trained to provide repair and maintenance services and have specialized knowledge of mechanics principles and vehicle fixing techniques and procedures.

The Zero motorcycle contains high voltage components that should be treated with extreme caution. Exposure to high voltage can cause shock, burns, and even death. Operating, servicing and maintaining a Zero motorcycle can expose one to chemicals including engine exhaust, carbon monoxide, phthalates, which can lead to reproductive harm. Zero motorcycles should at all times, and only be serviced by specially trained and skilled technicians.

This Service Manual is not intended for owners. Zero motorcycles' owners are expressly recommended to consult the relevant Owner's Manual accompanying the motorcycle, which is designed to provide owners with a better understanding of the operation, inspection, and basic maintenance requirements of the motorcycle. Damage, malfunctions, or performance problems caused by the failure to follow recommended repair, service and maintenance requirements stipulated in the Owner's Manual, are not covered by the Zero Motorcycles Limited Warranty.

Zero warrants that all original, factory-produced Zero motorcycles are free from defects in material and workmanship, pursuant to the applicable Limited Warranty conditions stipulated in the Owner's Manual accompanying the motorcycle. Zero strongly recommends to have all maintenance and repair services carried out by authorized Zero dealers or service partners. Damage, malfunctions, or performance problems caused to the motorcycle due to or after service or repair by an unauthorized service provider, or due to the improper service, repair or installation of parts/accessories not sold or approved by Zero or altering the motorcycle's specifications from those set by Zero, are not covered by the Zero Motorcycles Limited Warranty.

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How To Use This Manual

General

To assist in the use of this Manual, it is divided into numbered sections (shown on the previous page). Each section starts with a contents page listing the service procedures covered within that section. Each section is numbered from page 1, and the page number is shown at the bottom of each page.

References will be made from within a service procedure to other procedures that should be carried out as part of the main procedure.

The individual actions of the service procedures must be followed in the sequence in which they appear. Annotation numbers on the illustrations refer to the relevant numbered action after the illustration.

For reference purposes, an illustration number is shown in the bottom left hand corner of each illustration.

Important Information Types

The following words are used within this manual to call your attention to specific types of information.

WARNING! An action or information which must be followed precisely to avoid the possibility of injury.

CAUTION: Calls attention action or information which must be followed to avoid damage to components.

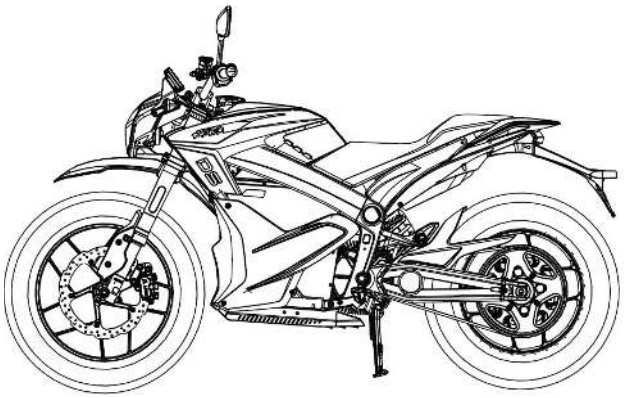
NOTICE: Information that must be performed before starting the repair procedure.

Note: Gives helpful information.

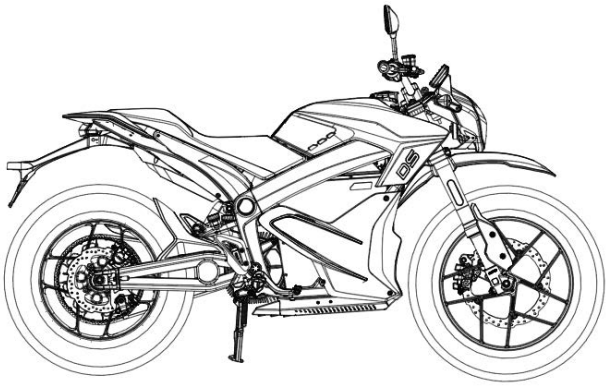
Dimensions

The dimensions quoted are to design engineering specification. Service limits are included where applicable.

Terminology



Left side of motorcycle.



Right side of motorcycle.

Abbreviations and Symbols

AC	Alternating current
Amp (A)	Ampere
AUX	Auxiliary
C	Celsius
CCM	Cellular Connectivity Module
CEL	Check Engine Light
cm	Centimeter
DC	Direct Current
dia.	Diameter
DOT	Department of Transportation
EPA	Environmental Protection Agency
EV	Electric Vehicle
F	Fahrenheit
FRT	Flat Rate Time
HCU	Hydraulic Control Unit
HV	High Voltage
HW	Hardware
lb-ft	pounds-feet
in-lb	inch-pound
LH	Left hand
MBB	Main Bike Board
mm	millimeter
Nm	Newton-metre
OAL	Overall Length
OBC	On-Board Charger
SoC	State of Charge
RH	Right hand
V	Volt
W	Watt

Important Repair Information

Replacement Fasteners

Replacement fasteners must be the correct part number for that application. Use the correct fastener in the correct location. Fasteners requiring the use of thread-locking compound are specified in the repair procedure; refer to the product manufacturer for proper usage.

One-time Use

Always use new lock nuts, lock washers, crush washers, cotter pins, and cable ties.

Coatings

Do not use paints, lubricants, or corrosion inhibitors on fasteners or fastener contact surfaces unless otherwise specified in the Installation notes. Coatings affect fastener torque and clamping force, as well as damage the fastener. Coatings can also affect the operation of electrical components.

Repair of Electric Vehicles

Zero Motorcycles are electrically powered vehicles ("e-vehicles") under which Regulation No. 100 of UNECE [2015/505] applies. In order to safely repair Zero Motorcycles, it is essential that any electrical hazards are eliminated, and damaged motorcycles or electrically hazardous components should be handled and stored safely. All work on Zero Motorcycles and their components must be carried out in compliance with safety instructions supplied by Zero Motorcycles and all applicable local standards and e-vehicle requirements.

Testing After a Repair

Operations covered in this Manual do not include reference to testing the motorcycle after repair. It is essential that work is inspected and tested after completion and if necessary a road test of the motorcycle is carried out. This is of particular importance where safety related items are concerned.

Description of Safety Cautions, Notices, and Important

Cautions, Notices, and Important are elements designed to prevent hazards, however, not all hazards can be foreseen. This information is placed at strategic locations within the service manual.

⚠ CAUTION

Caution is used for the technician to take necessary action or not to take a prohibited action. Cautions are used to help prevent bodily injury to the technician or to the owner if the motorcycle was improperly repaired.

Note: is used to call special attention to a necessary action or to a prohibited action. Notices are used to prevent damage to the motorcycle or prevent unnecessary repairs.

Important: is used to provide additional information or to clarify a procedure.



This symbol is located in various locations on the motorcycle to inform you that exposure to high voltage can cause shock, burns and even death.

The high voltage components on the motorcycle should be serviced by technicians with special training.

High voltage cable or wiring has an orange covering. Do not probe, tamper with, cut, or modify high voltage cable or wiring.

This manual covers the following motorcycle:

- Zero S
- Zero SR
- Zero DS
- Zero DSR

Cautions, Notices and Important

Brake Fluid Irritant Caution

⚠ CAUTION

Brake fluid may irritate eyes and skin. In case of contact, take the following actions:

- Eye Contact-rinse thoroughly with water
- Skin Contact-wash with soap and water
- If Ingested-contact a physician immediately

Eye Protectant Caution

⚠ CAUTION

Approved safety glasses and gloves should be worn when performing this procedure to reduce the chance of personal injury.

Road Test Caution

⚠ CAUTION

Test ride the motorcycle under safe conditions. Do not attempt any maneuvers that could jeopardize the motorcycles control. Failure to adhere to these precautions could lead to serious personal injury and motorcycle damage.

Brake Fluid Effects on Paint and Electrical Components Notice

Notice: Avoid spilling brake fluid onto painted or other surfaces, electrical connections, wiring, or cables. Brake fluid will damage painted or other surfaces and cause corrosion to electrical components. If any brake fluid comes in contact with painted surfaces, immediately flush the area with water. If any brake fluid comes in contact with electrical connections, wiring, or cables, use a clean shop cloth to wipe away the fluid.

Fastener Notice

Notice: Replacement fasteners must be the correct part number for that application. Use the correct fastener in the correct location. Fasteners requiring the use of thread-locking compound are specified in the repair procedure; refer to the product manufacture for proper usage. Always use new lock nuts, lock washers and cotter pins. Do not use paints, lubricants, or corrosion inhibitors on fasteners or fastener contact surfaces unless specified in the procedure. Coatings affect fastener torque and joint clamping force and may damage the fastener.

High Voltage Caution

⚠ CAUTION

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed.

Failure to follow the procedures may result in serious injury or death.

- Always verify that the high voltage has been disabled before working on or around high voltage components, wires, cables, or harnesses.
- Remove all metal objects such as rings and watches.
- Always tighten the high voltage terminal fasteners to the specified torque. Insufficient or excessive torque will cause malfunctions or damage.
- After finishing work on the high voltage system and before turning the key ON.
- Verify high voltage system integrity and that all connectors and covers are installed.
- Verify that all tools or loose components have been removed.

⚠ CAUTION

Exposure to high voltage can cause shock, burns, and even death. The high voltage components on the motorcycle should only be serviced by technicians familiar with the circuit/system operation.

High voltage components are identified by labels. Do not remove, open, take apart, or modify these components. High voltage cable or wiring has orange covering. Do not probe, tamper with, cut, or modify high voltage cable or wiring.

Unpacking Procedure

Although unpacking the Zero motorcycle can be done by a single person, it is recommended to have a second person to help lift and remove your motorcycle from the crate base.

Wood Shipping Crate

Outer Box Cover

1. Cut and remove the two metal outer box retention straps.
2. Remove the screws along the crate base.
3. Remove the screws along the side of the crate that has the metal clamps on it.
4. Remove the metal clamps, and remove the side panel.
5. Remove the remaining outer box cover.

Inner Assembly

1. Carefully remove plastic cover from motorcycle.
2. Locate small parts box below motorcycle and put to the side. (This box contains important documentation, owner's manual, keys, handlebar clamps, and hardware, etc.)
3. Carefully lift rear portion of the motorcycle over the swingarm standoff and off crate base.
4. Carefully lift front wheel out of crate base.
5. Deploy kickstand, lean motorcycle and inspect in accordance with delivery inspection sheet.

Cardboard Shipping Crate

Outer Box Cover

1. Cut and remove the two outer box retention straps.

2. Unscrew the stabilizer bar bolts, one on each side of outer box.
3. Open box top and remove inner cardboard end reinforcement sleeves.
4. Unscrew stabilizer bar from handlebar riser and remove.
5. Unscrew lower crate cover retaining screws and washers.
6. Lift of cut outer box away from motorcycle.

Inner Assembly

1. Carefully remove plastic cover from motorcycle.
2. Locate small parts box below motorcycle and put to the side. (This box contains important documentation, owner's manual, keys).
3. Remove power pack retaining frame rail.
4. Remove power pack.
5. Remove the tie down straps from crate base.
6. Carefully lift rear portion of the motorcycle over the swingarm standoff and off crate base.
7. Carefully lift front wheel out of crate base.
8. Deploy kickstand (if equipped), lean motorcycle and inspect in accordance with delivery inspection sheet.

Recycling

The Zero Motorcycles shipping crate and packaging materials were designed to be completely recycled. Please cut down and recycle all cardboard, plastic, and metal materials in appropriate receptacles.

The tie down straps that accompanied your motorcycle can be reused as regular tie down straps for transporting your motorcycle.

Dealer Pre-Delivery Inspection

The latest version of the Pre-Delivery Inspection Checklist is available to your dealership through Zero Motorcycles Service Portal (Service.Zeromotorcycles.com) in the Dealer FAQ section.

Please insert a copy of this PDI in your sales packet for the customer.

ZERO MOTORCYCLES®

2023 Zero SDS
Pre-Delivery Inspection Form

Please attach this form to any PDI warranty claim or email to support@zeromotorcycles.com in the Americas or to eu.support@zeromotorcycles.com in the EMEA region.

Beginning January 2022, motorcycles are shipped with drive belts loosened.
The drive belt MUST be properly tensioned before riding.

Motorcycle VIN# (last 5 digits):	Motorcycle Factory Configuration: ☐ S ZF14.4 ☐ DSR ☐ S ZF7.2 ☐ DS ZF14.4 ☐ DS ZF7.2
Dealer Name:	Technician Name:
Phone Number:	Email Address:

- ☐ Verify both keys are present (two black keys). Use one of the black keys to confirm that it works correctly in each lock.
  - ☐ Tank trunk latch
  - ☐ Side storage latch (ZF7.2 motorcycles only)
  - ☐ Key switch
- ☐ Verify motorcycle powers on when key is inserted in key switch and is turned to the on position. Turn key switch off.
- ☐ Verify that motorcycle powers on and starts charging when the supplied power cord is connected to the on-board charger connector on the left side of the motorcycle. Unplug power cord.
- ☐ For Charge Tank equipped motorcycles, verify that motorcycle powers on and starts charging when connected to an EVSE using J1772 or Type 2 charge cable. Unplug charge cable.
- ☐ Remove safety film and inspect all surface areas for imperfections.
- ☐ Check tire pressure.
  - ☐ Front tire (32 PSI / 2.2 bar)
  - ☐ Rear tire (34 PSI / 2.3 bar)
- ☐ Check brake fluid levels in front and rear master cylinder.
- ☐ Check torque values of critical fasteners:
  - ☐ Front axle (40 ft-lbs / 54 Nm)
  - ☐ Front axle pinch bolts (16 ft-lbs / 22 Nm)
  - ☐ Front brake caliper mounting bolts (19 ft-lbs / 26 Nm)

If you have any questions, please contact the Dealer Experience Hotline.
In the Americas: 888-RUN-ZERO (888-786-9376) Ext 2
In the EMEA region: +31 (0) 72 5112014

ZERO MOTORCYCLES®

- ☐ Front rotor bolts (19 ft-lbs / 26 Nm)
- ☐ Handlebar mount bolts (19 ft-lbs / 26 Nm)
- ☐ Motor mount bolts – left hand side (26 ft-lbs / 35 Nm)
- ☐ Motor mount bolts – right hand side (20 ft-lbs / 27 Nm)
- ☐ Power pack mount bolts (20 ft-lbs / 27 Nm)
- ☐ Rear axle (75 ft-lbs / 102 Nm)
- ☐ Rear rotor bolts (9.5 ft-lbs / 13 Nm)
- ☐ Fork tube pinch bolts (16 ft-lbs / 22 Nm)

☐ Check belt tension at four locations by rotating the rear wheel forward one quarter turn after each check. Avoid rotating backwards. All locations need to be within 42.5 Hz to 73.6 Hz, as measured with the Gates Carbon Drive smartphone app. If not, adjust until all four locations are within range.

☐ Check all 12-volt system components and related switch gear for proper operation:

- ☐ Turn signals (left and right, front and rear)
- ☐ Headlight (low and high beam) – Also confirm proper alignment.
- ☐ Taillight (using both front and rear brakes)
- ☐ Horn
- ☐ Hazard lights

☐ Place motorcycle on a rear paddock stand and verify proper operation of throttle.

☐ Check firmware versions using the Zero Diagnostics Utility or Diag4Zero dealer diagnostic tools. Update firmware if needed.

☐ Check the Zero Motorcycles Partner Community for any open Service Campaigns or Recalls by searching on the last five digits of the VIN# from the Support tab.

☐ Perform motorcycle test ride taking care to re-verify proper throttle operation and verify front and rear brake operation at speeds less than 10 mph (15 km/h).

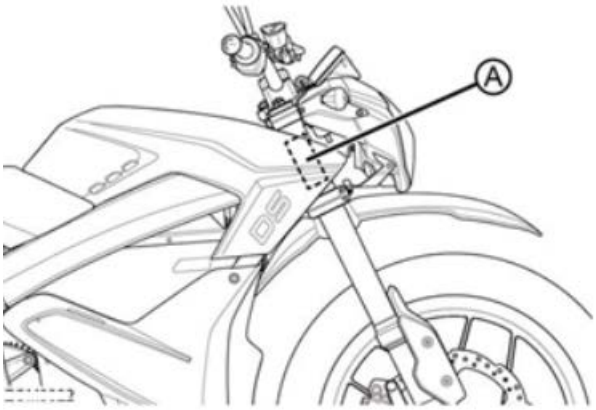
☐ During initial portion of motorcycle test ride, bed in front and rear brake pads by performing a series of braking maneuvers from 50 mph to 10 mph without coming to a complete stop. Let brakes cool between passes.

☐ Plug in charger and confirm motorcycle charges to 100%.

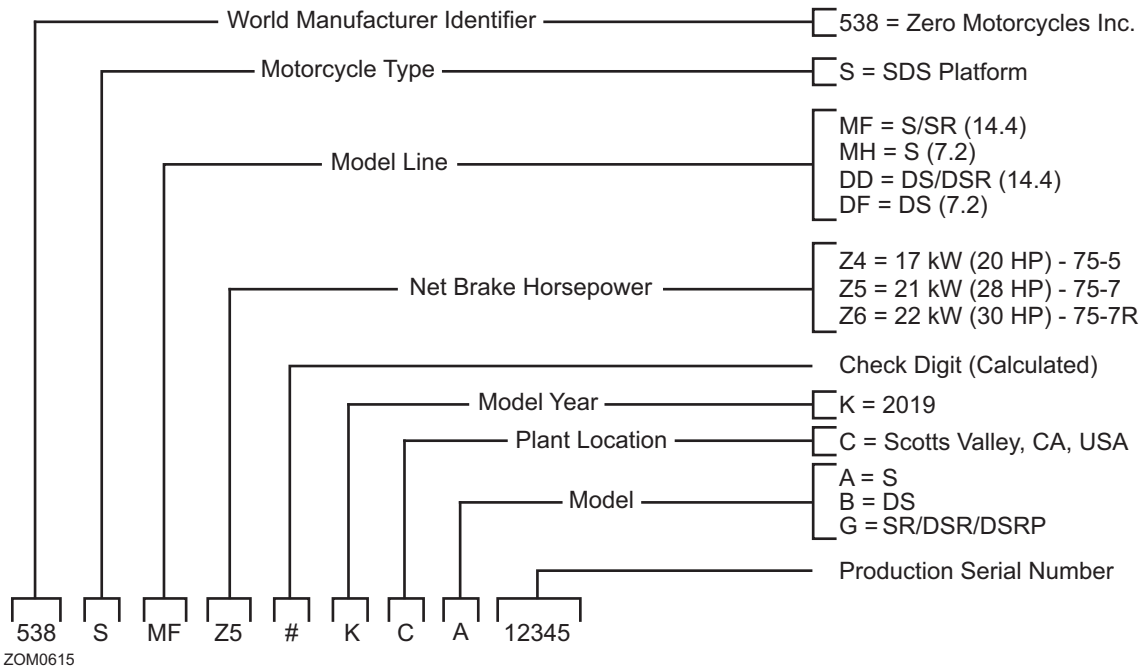
If you have any questions, please contact the Dealer Experience Hotline.
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Vehicle Identification

Vehicle Identification Number (VIN)

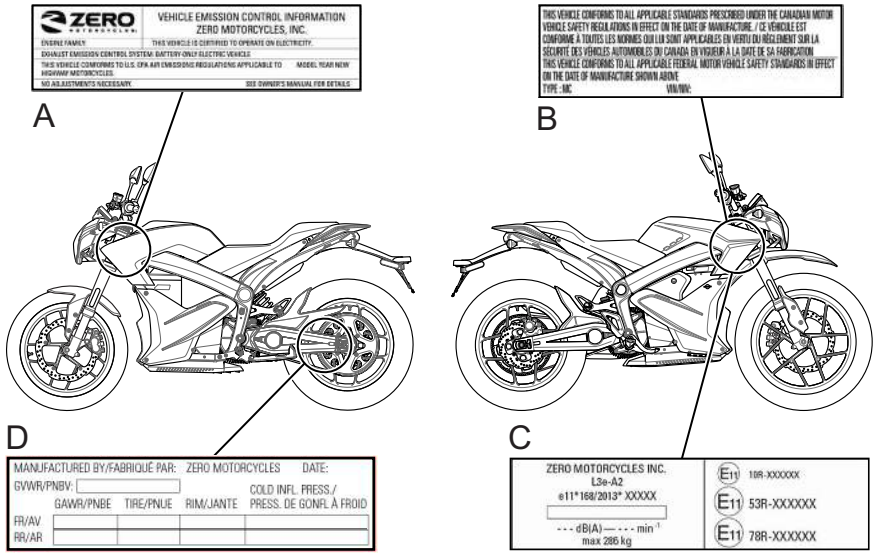


VIN Break Down



The VIN is a 17-digit number stamped on the head tube of the frame. Do not alter or remove this as it is the legal identifier for the motorcycle.

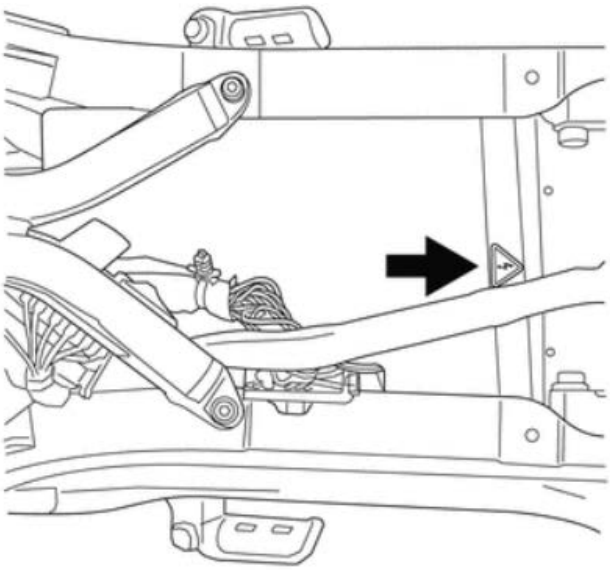
Location of Important Labels

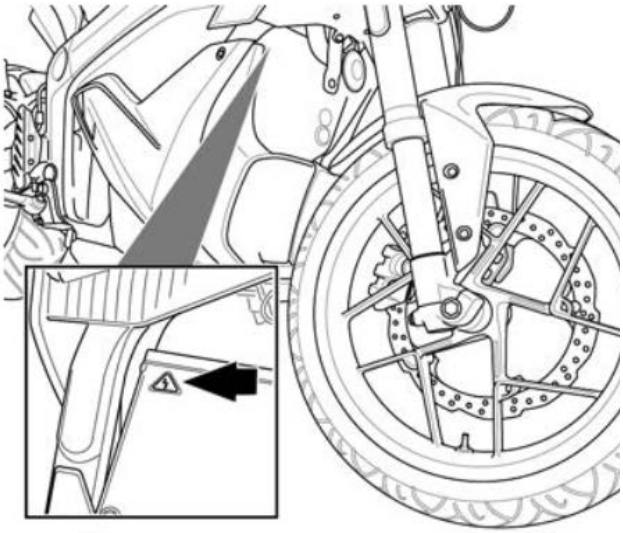


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High Voltage Warning Labels

Located under the seat above the motor controller





Tools and Equipment

Use only Zero specified tools when servicing the motorcycle. The motorcycle contains a mix of metric and standard fasteners. Use of the incorrect tool or fastener may damage the motorcycle.

All dealers should have the following:

Special Tools:

- PN 85-05665 Controller Discharge Tool



Zero0044

Basic Tools:

- Safety glasses
- Spring loaded center punch
- 2.5 mm, 3 mm, 4 mm, 5 mm, 6 mm, 8 mm and 10 mm T, L, and socket hex wrenches
- 7 mm L Allen wrench
- T25 star driver or socket bit
- T15 tamperproof star socket
- Zip tie pulling/cutting gun
- 7 mm, 8 mm, 10 mm, 13 mm, 14 mm, 15 mm, 17 mm, 21 mm combination wrench
- Gear puller (motor sprocket)
- Rubber dead blow hammer
- Punch
- Flat and rat tail file
- Heavy duty 420 chain breaker
- Phillips and Flat head screw drivers
- 1/4" drive 1", 2", and 3" socket extension
- 3/8" drive 1", 2", and 3" socket extension
- Needle nose pliers
- Adjustable pin spanner wrench
- 1/4" and 3/8" drive socket wrench
- Bicycle type headset press and removal tool
- Belt tension tester
- External snap ring pliers
- 7 mm, 8 mm, 10 mm, 13 mm, 1/4" and 3/8" drive socket
- 27 mm socket
- Motorcycle head bearing press and removal tool

Equipment:

- Tire levers and or a tire changing machine
- Motorcycle stand/lift

General Specifications

S

Description	ZF7.2	ZF7.2 + Power Tank	ZF14.4	ZF14.4 + Power Tank
Range				
City	89 mi (143 km)	133 mi (214 km)	179 mi (288 km)	223 mi (359 km)
Highway, 55 mph Constant Speed	54 mi (87 km)	81 mi (130 km)	109 mi (175 km)	136 mi (219 km)
City/Highway, 55 mph Combined	68 mi (109 km)	101 mi (163 km)	135 mi (217 km)	169 mi (272 km)
Highway, 70 mph Constant Speed	45 mi (72 km)	67 mi (108 km)	90 mi (145 km)	112 mi (180 km)
City/Highway, 70 mph Combined	60 mi (97 km)	89 mi (143 km)	120 mi (193 km)	150 mi (241 km)
Motor				
Estimated Top Speed (max)	98 mi (158 km)	98 mi (158 km)	98 mi (158 km)	98 mi (158 km)
Estimated Top Speed (sustained)	80 mi (129 km)	80 mi (129 km)	85 mi (137 km)	85 mi (137 km)
Type	Z-Force® 75-5 passively air-cooled, high efficiency, radial flux, permanent magnet, brushless motor	Z-Force® 75-7 passively air-cooled, high efficiency, radial flux, permanent magnet, brushless motor	Z-Force® 75-7 passively air-cooled, high efficiency, radial flux, permanent magnet, brushless motor	Z-Force® 75-7 passively air-cooled, high efficiency, radial flux, permanent magnet, brushless motor
Controller	High efficiency, 550 amp, 3-phase brushless controller with regenerative deceleration	High efficiency, 550 amp, 3-phase brushless controller with regenerative deceleration	High efficiency, 550 amp, 3-phase brushless controller with regenerative deceleration	High efficiency, 550 amp, 3-phase brushless controller with regenerative deceleration
Power System				
Nominal Voltage	102.2 V	102.2 V	102.2 V	102.2 V
Power pack	Z-Force® Li-Ion intelligent modular	Z-Force® Li-Ion intelligent integrated	Z-Force® Li-Ion intelligent integrated	Z-Force® Li-Ion intelligent integrated
Max capacity	7.2 kWh	10.8 kWh	14.4 kWh	18.0 kWh
Nominal capacity	6.3 kWh	9.5 kWh	12.6 kWh	15.8 kWh
Charger type	1.3 kW, integrated	1.3 kW, integrated	1.3 kW, integrated	1.3 kW, integrated
Charge time (standard)	5.2 hours (100% charged) / 4.7 hours (95% charged)	7.5 hours (100% charged) / 7.0 hours (95% charged)	9.8 hours (100% charged) / 9.3 hours (95% charged)	12.1 hours (100% charged) / 11.6 hours (95% charged)
Zero Rapid Charge Time (with one accessory charger)	3.1 hours (100% charged) / 2.6 hours (95% charged)	4.4 hours (100% charged) / 3.9 hours (95% charged)	5.7 hours (100% charged) / 5.2 hours (95% charged)	7.0 hours (100% charged) / 6.5 hours (95% charged)
Zero Rapid Charge Time (with max accessory chargers)	1.6 hours (100% charged) / 1.1 hours (95% charged)	2.2 hours (100% charged) / 2.7 hours (95% charged)	2.2 hours (100% charged) / 2.7 hours (95% charged)	3.3 hours (100% charged) / 2.8 hours (95% charged)
6kW Charge-Tank Accessory Charge Time	1.5 hours (100% charged) / 1.0 hours (95% charged)	N/A	2.5 hours (100% charged) / 2.0 hours (95% charged)	N/A

Description	ZF7.2	ZF7.2 + Power Tank	ZF14.4	ZF14.4 + Power Tank
Drivetrain				
Transmission	Clutchless direct drive	Clutchless direct drive	Clutchless direct drive	Clutchless direct drive
Final drive	Poly Chain® HTD® Carbon™ belt	Poly Chain® HTD® Carbon™ belt	Poly Chain® HTD® Carbon™ belt	Poly Chain® HTD® Carbon™ belt
Motor Sprocket Size (# of teeth)	18	18	20	20
Wheel Sprocket Size (# of teeth)	90	90	90	90
Chassis / Suspension / Brakes				
Front suspension	Showa 41 mm inverted cartridge forks, with adjustable spring preload, compression and rebound damping	Showa 41 mm inverted cartridge forks, with adjustable spring preload, compression and rebound damping	Showa 41 mm inverted cartridge forks, with adjustable spring preload, compression and rebound damping	Showa 41 mm inverted cartridge forks, with adjustable spring preload, compression and rebound damping
Rear suspension	Showa 40 mm piston, piggy-back reservoir shock with adjustable spring preload, compression and rebound damping	Showa 40 mm piston, piggy-back reservoir shock with adjustable spring preload, compression and rebound damping	Showa 40 mm piston, piggy-back reservoir shock with adjustable spring preload, compression and rebound damping	Showa 40 mm piston, piggy-back reservoir shock with adjustable spring preload, compression and rebound damping
Front suspension travel	6.25 in (159 mm)	6.25 in (159 mm)	6.25 in (159 mm)	6.25 in (159 mm)
Rear suspension travel	6.25 in (159 mm)	6.25 in (159 mm)	6.25 in (159 mm)	6.25 in (159 mm)
Front brakes	Bosch Gen 9 ABS, J-Juan Floating 2 asymmetric piston hydraulic caliper, 320x5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 2 asymmetric piston hydraulic caliper, 320x5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 2 asymmetric piston hydraulic caliper, 320x5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 2 asymmetric piston hydraulic caliper, 320x5 mm thick disc
Rear brakes	Bosch Gen 9 ABS, J-Juan Floating 1 piston hydraulic caliper, 240x4.5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 1 piston hydraulic caliper, 240x4.5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 1 piston hydraulic caliper, 240x4.5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 1 piston hydraulic caliper, 240x4.5 mm thick disc
Front tire	110/70-17	110/70-17	110/70-17	110/70-17
Rear tire	140/70-17	140/70-17	140/70-17	140/70-17
Front wheel	3.00x17	3.00x17	3.00x17	3.00x17
Rear wheel	3.00x17	3.00x17	3.00x17	3.00x17
Dimensions				
Wheel base	55.5 in (1,410 mm)	55.5 in (1,410 mm)	55.5 in (1,410 mm)	55.5 in (1,410 mm)
Seat height	31.8 in (807 mm)	31.8 in (807 mm)	31.8 in (807 mm)	31.8 in (807 mm)
Rake (1/3 suspension sag)	24.0 °	24.0 °	24.0 °	24.0 °
Trail (1/3 suspension sag)	3.2 in (80 mm)	3.2 in (80 mm)	3.2 in (80 mm)	3.2 in (80 mm)
Weight				
Curb weight	313 lb (142 kg)	408 lb (185 kg)	408 lb (185 kg)	452 lb (205 kg)
Carrying capacity	404 lb (183 kg)	323 lb (147 kg)	323 lb (147 kg)	323 lb (147 kg)

SR

Description	ZF14.4	ZF14.4 + Power Tank
Range		
City	179 mi (288 km)	223 mi (359 km)
Highway, 55 mph Constant Speed	109 mi (175 km)	136 mi (219 km)
City/Highway, 55 mph Combined	135 mi (217 km)	169 mi (272 km)
Highway, 70 mph Constant Speed	90 mi (145 km)	112 mi (180 km)
City/Highway, 70 mph Combined	120 mi (193 km)	150 mi (241 km)
Motor		
Estimated Top Speed (max)	102 mi (164 km)	102 mi (164 km)
Estimated Top Speed (sustained)	95 mi (153 km)	95 mi (153 km)
Type	Z-Force® 75-7R passively air-cooled, high efficiency, radial flux, permanent magnet, brushless motor	Z-Force® 75-7 passively air-cooled, high efficiency, radial flux, permanent magnet, brushless motor
Controller	High efficiency, 775 amp, 3-phase brushless controller with regenerative deceleration	High efficiency, 775 amp, 3-phase brushless controller with regenerative deceleration
Power System		
Nominal Voltage	102.2 V	102.2 V
Power pack	Z-Force® Li-Ion intelligent integrated	Z-Force® Li-Ion intelligent integrated
Max capacity	14.4 kWh	18.0 kWh
Nominal capacity	12.6 kWh	15.8 kWh
Charger type	1.3 kW, integrated	1.3 kW, integrated
Charge time (standard)	9.8 hours (100% charged) / 9.3 hours (95% charged)	12.1 hours (100% charged) / 11.6 hours (95% charged)
Zero Rapid Charge Time (with one accessory charger)	5.7 hours (100% charged) / 5.2 hours (95% charged)	7.0 hours (100% charged) / 6.5 hours (95% charged)
Zero Rapid Charge Time (with max accessory chargers)	2.8 hours (100% charged) / 2.3 hours (95% charged)	3.3 hours (100% charged) / 2.8 hours (95% charged)
6kW Charge-Tank Accessory Charge Time	2.5 hours (100% charged) / 2.0 hours (95% charged)	N/A
Drivetrain		
Transmission	Clutchless direct drive	Clutchless direct drive
Final drive	Poly Chain® HTD® Carbon™ belt	Poly Chain® HTD® Carbon™ belt
Motor Sprocket Size (# of teeth)	20	20
Wheel Sprocket Size (# of teeth)	90	90
Chassis / Suspension / Brakes		
Front suspension	Showa 41 mm inverted cartridge forks, with adjustable spring preload, compression and rebound damping	Showa 41 mm inverted cartridge forks, with adjustable spring preload, compression and rebound damping

Description	ZF14.4	ZF14.4 + Power Tank
Rear suspension	Showa 40 mm piston, piggy-back reservoir shock with adjustable spring preload, compression and rebound damping	Showa 40 mm piston, piggy-back reservoir shock with adjustable spring preload, compression and rebound damping
Front suspension travel	6.25 in (159 mm)	6.25 in (159 mm)
Rear suspension travel	6.35 in (161 mm)	6.35 in (161 mm)
Front brakes	Bosch Gen 9 ABS, J-Juan Floating 2 asymmetric piston hydraulic caliper, 320x5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 2 asymmetric piston hydraulic caliper, 320x5 mm thick disc
Rear brakes	Bosch Gen 9 ABS, J-Juan Floating 1 piston hydraulic caliper, 240x4.5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 1 piston hydraulic caliper, 240x4.5 mm thick disc
Front tire	110/70-17	110/70-17
Rear tire	140/70-17	140/70-17
Front wheel	3.00x17	3.00x17
Rear wheel	3.50x17	3.50x17
Dimensions		
Wheel base	55.5 in (1,410 mm)	55.5 in (1,410 mm)
Seat height	31.8 in (807 mm)	31.8 in (807 mm)
Rake (1/3 suspension sag)	24.0 °	24.0 °
Trail (1/3 suspension sag)	3.2 in (80 mm)	3.2 in (80 mm)
Weight		
Curb weight	414 lb (188 kg)	458 lb (208 kg)
Carrying capacity	361 lb (164 kg)	317 lb (144 kg)

DS

Description	ZF7.2	ZF7.2 + Power Tank	ZF14.4	ZF14.4 + Power Tank
Range				
City	82 mi (132 km)	121 mi (195 km)	163 mi (262 km)	204 mi (328 km)
Highway, 55 mph Constant Speed	49 mi (79 km)	73 mi (117 km)	98 mi (196 km)	122 mi (196 km)
City/Highway, 55 mph Combined	61 mi (98 km)	91 mi (146 km)	122 mi (196 km)	153 mi (246 km)
Highway, 70 mph Constant Speed	39 mi (63 km)	58 mi (93 km)	78 mi (126 km)	97 mi (156 km)
City/Highway, 70 mph Combined	53 mi (85 km)	78 mi (126 km)	105 mi (169 km)	132 mi (212 km)
Motor				
Estimated Top Speed (max)	98 mi (158 km)	98 mi (158 km)	98 mi (158 km)	98 mi (158 km)
Estimated Top Speed (sustained)	80 mi (129 km)	80 mi (129 km)	85 mi (137 km)	85 mi (137 km)
Type	Z-Force® 75-5 passively air-cooled, high efficiency, radial flux, permanent magnet, brushless motor	Z-Force® 75-7 passively air-cooled, high efficiency, radial flux, permanent magnet, brushless motor	Z-Force® 75-7 passively air-cooled, high efficiency, radial flux, permanent magnet, brushless motor	Z-Force® 75-7 passively air-cooled, high efficiency, radial flux, permanent magnet, brushless motor
Controller	High efficiency, 550 amp, 3-phase brushless controller with regenerative deceleration	High efficiency, 550 amp, 3-phase brushless controller with regenerative deceleration	High efficiency, 550 amp, 3-phase brushless controller with regenerative deceleration	High efficiency, 550 amp, 3-phase brushless controller with regenerative deceleration
Power System				
Nominal Voltage	102.2 V	102.2 V	102.2 V	102.2 V
Power pack	Z-Force® Li-Ion intelligent modular	Z-Force® Li-Ion intelligent integrated	Z-Force® Li-Ion intelligent integrated	Z-Force® Li-Ion intelligent integrated
Max capacity	7.2 kWh	10.8 kWh	14.4 kWh	18.0 kWh
Nominal capacity	6.3 kWh	9.5 kWh	12.6 kWh	15.8 kWh
Charger type	1.3 kW, integrated	1.3 kW, integrated	1.3 kW, integrated	1.3 kW, integrated
Charge time (standard)	5.2 hours (100% charged) / 4.7 hours (95% charged)	7.5 hours (100% charged) / 7.0 hours (95% charged)	9.8 hours (100% charged) / 9.3 hours (95% charged)	12.1 hours (100% charged) / 11.6 hours (95% charged)
Zero Rapid Charge Time (with one accessory charger)	3.1 hours (100% charged) / 2.6 hours (95% charged)	4.4 hours (100% charged) / 3.9 hours (95% charged)	5.7 hours (100% charged) / 5.2 hours (95% charged)	7.0 hours (100% charged) / 6.5 hours (95% charged)
Zero Rapid Charge Time (with max accessory chargers)	1.6 hours (100% charged) / 1.1 hours (95% charged)	2.2 hours (100% charged) / 2.7 hours (95% charged)	2.2 hours (100% charged) / 2.7 hours (95% charged)	3.3 hours (100% charged) / 2.8 hours (95% charged)
6kW Charge-Tank Accessory Charge Time	1.5 hours (100% charged) / 1.0 hours (95% charged)	N/A	2.5 hours (100% charged) / 2.0 hours (95% charged)	N/A

Description	ZF7.2	ZF7.2 + Power Tank	ZF14.4	ZF14.4 + Power Tank
Drivetrain				
Transmission	Clutchless direct drive	Clutchless direct drive	Clutchless direct drive	Clutchless direct drive
Final drive	Poly Chain® HTD® Carbon™ belt	Poly Chain® HTD® Carbon™ belt	Poly Chain® HTD® Carbon™ belt	Poly Chain® HTD® Carbon™ belt
Motor Sprocket Size (# of teeth)	18	18	20	20
Wheel Sprocket Size (# of teeth)	90	90	90	90
Chassis / Suspension / Brakes				
Front suspension	Showa 41 mm inverted cartridge forks, with adjustable spring preload, compression and rebound damping	Showa 41 mm inverted cartridge forks, with adjustable spring preload, compression and rebound damping	Showa 41 mm inverted cartridge forks, with adjustable spring preload, compression and rebound damping	Showa 41 mm inverted cartridge forks, with adjustable spring preload, compression and rebound damping
Rear suspension	Showa 40 mm piston, piggy-back reservoir shock with adjustable spring preload, compression and rebound damping	Showa 40 mm piston, piggy-back reservoir shock with adjustable spring preload, compression and rebound damping	Showa 40 mm piston, piggy-back reservoir shock with adjustable spring preload, compression and rebound damping	Showa 40 mm piston, piggy-back reservoir shock with adjustable spring preload, compression and rebound damping
Front suspension travel	7.00 in (178 mm)	7.00 in (178 mm)	7.00 in (178 mm)	7.00 in (178 mm)
Rear suspension travel	7.03 in (179 mm)	7.03 in (179 mm)	7.03 in (179 mm)	7.03 in (179 mm)
Front brakes	Bosch Gen 9 ABS, J-Juan Floating 2 piston hydraulic caliper, 320x5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 2 piston hydraulic caliper, 320x5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 2 piston hydraulic caliper, 320x5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 2 piston hydraulic caliper, 320x5 mm thick disc
Rear brakes	Bosch Gen 9 ABS, J-Juan Floating 1 piston hydraulic caliper, 240x4.5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 1 piston hydraulic caliper, 240x4.5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 1 piston hydraulic caliper, 240x4.5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 1 piston hydraulic caliper, 240x4.5 mm thick disc
Front tire	100/90-19	100/90-19	100/90-19	100/90-19
Rear tire	130/80-17	130/80-17	130/80-17	130/80-17
Front wheel	2.50x19	2.50x19	2.50x19	2.50x19
Rear wheel	3.50x17	3.50x17	3.50x17	3.50x17
Dimensions				
Wheel base	56.2 in (1,427 mm)	56.2 in (1,427 mm)	56.2 in (1,427 mm)	56.2 in (1,427 mm)
Seat height	33.2 in (843 mm)	33.2 in (843 mm)	33.2 in (843 mm)	33.2 in (843 mm)
Rake (1/3 suspension sag)	26.5 °	26.5 °	26.5 °	26.5 °
Trail (1/3 suspension sag)	4.6 in (117 mm)	4.6 in (117 mm)	4.6 in (117 mm)	4.6 in (117 mm)
Weight				
Curb weight	313 lb (142 kg)	408 lb (185 kg)	408 lb (185 kg)	452 lb (205 kg)
Carrying capacity	404 lb (183 kg)	285 lb (129 kg)	367 lb (166 kg)	323 lb (147 kg)

DSR

Description	ZF14.4	ZF14.4 + Power Tank
Range		
City	163 mi (262 km)	204 mi (328 km)
Highway, 55 mph Constant Speed	98 mi (158 km)	122 mi (196 km)
City/Highway, 55 mph Combined	122 mi (196 km)	153 mi (246 km)
Highway, 70 mph Constant Speed	78 mi (126 km)	97 mi (156 km)
City/Highway, 70 mph Combined	105 mi (169 km)	132 mi (212 km)
Motor		
Estimated Top Speed (max)	102 mi (164 km)	102 mi (164 km)
Estimated Top Speed (sustained)	90 mi (145 km)	90 mi (145 km)
Type	Z-Force® 75-7R passively air-cooled, high efficiency, radial flux, permanent magnet, brushless motor	Z-Force® 75-7 passively air-cooled, high efficiency, radial flux, permanent magnet, brushless motor
Controller	High efficiency, 775 amp, 3-phase brushless controller with regenerative deceleration	High efficiency, 775 amp, 3-phase brushless controller with regenerative deceleration
Power System		
Nominal Voltage	102.2 V	102.2 V
Power pack	Z-Force® Li-Ion intelligent integrated	Z-Force® Li-Ion intelligent integrated
Max capacity	14.4 kWh	18.0 kWh
Nominal capacity	12.6 kWh	15.8 kWh
Charger type	1.3 kW, integrated	1.3 kW, integrated
Charge time (standard)	9.8 hours (100% charged) / 9.3 hours (95% charged)	12.1 hours (100% charged) / 11.6 hours (95% charged)
Zero Rapid Charge Time (with one accessory charger)	5.7 hours (100% charged) / 5.2 hours (95% charged)	7.0 hours (100% charged) / 6.5 hours (95% charged)
Zero Rapid Charge Time (with max accessory chargers)	2.8 hours (100% charged) / 2.3 hours (95% charged)	3.3 hours (100% charged) / 2.8 hours (95% charged)
6kW Charge-Tank Accessory Charge Time	2.5 hours (100% charged) / 2.0 hours (95% charged)	N/A
Drivetrain		
Transmission	Clutchless direct drive	Clutchless direct drive
Final drive	Poly Chain® HTD® Carbon™ belt	Poly Chain® HTD® Carbon™ belt
Motor Sprocket Size (# of teeth)	20	20
Wheel Sprocket Size (# of teeth)	90	90
Chassis / Suspension / Brakes		
Front suspension	Showa 41 mm inverted cartridge forks, with adjustable spring preload, compression and rebound damping	Showa 41 mm inverted cartridge forks, with adjustable spring preload, compression and rebound damping

Description	ZF14.4	ZF14.4 + Power Tank
Rear suspension	Showa 40 mm piston, piggy-back reservoir shock with adjustable spring preload, compression and rebound damping	Showa 40 mm piston, piggy-back reservoir shock with adjustable spring preload, compression and rebound damping
Front suspension travel	7.00 in (178 mm)	7.00 in (178 mm)
Rear suspension travel	7.03 in (179 mm)	7.03 in (179 mm)
Front brakes	Bosch Gen 9 ABS, J-Juan Floating 2 asymmetric piston hydraulic caliper, 320x5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 2 asymmetric piston hydraulic caliper, 320x5 mm thick disc
Rear brakes	Bosch Gen 9 ABS, J-Juan Floating 1 piston hydraulic caliper, 240x4.5 mm thick disc	Bosch Gen 9 ABS, J-Juan Floating 1 piston hydraulic caliper, 240x4.5 mm thick disc
Front tire	100/90-19	100/90-19
Rear tire	130/80-17	130/80-17
Front wheel	2.50x19	2.50x19
Rear wheel	3.50x17	3.50x17
Dimensions		
Wheel base	56.2 in (1,437 mm)	56.2 in (1,437 mm)
Seat height	33.2 in (843 mm)	33.2 in (843 mm)
Rake (1/3 suspension sag)	26.5 °	26.5 °
Trail (1/3 suspension sag)	4.6 in (117 mm)	4.6 in (117 mm)
Weight		
Curb weight	419 lb (190 kg)	463 lb (210 kg)
Carrying capacity	356 lb (161 kg)	312 lb (142 kg)

Vibration Diagnostic Process

Important: Using the following steps of the vibration diagnostic process will help you to effectively narrow-down and pin-point the search for the specific source of a vibration concern and to arrive at an accurate repair.

1. Gather specific information on the customer's vibration concern.
2. Perform the road testing steps in sequence as identified in Road Testing Procedure in order to duplicate the customer's concern and evaluate the symptoms of the concern under changing conditions. Observe what the vibration feels like and what it sounds like. Observe when the symptoms first appear, when they change, and when they cease.
3. Determine if the customer's vibration concern is truly an abnormal condition or something that is potentially an operating characteristic of the motorcycle.
4. Systematically eliminate or 'rule-out' possible motorcycle systems.
5. Focus diagnostic efforts on the remaining motorcycle system and systematically eliminate or "rule-out" possible components of that system.
6. Make a repair on the remaining component, or components, which have not been eliminated systematically, and must therefore be the cause of the vibration.
7. Verify that the customer's concern has been eliminated or at least brought to an acceptable level.
8. Again perform the road testing steps in sequence in order to verify that the vehicle did not have more than one vibration occurring.

Preliminary Visual/Physical Inspection

- Inspect for aftermarket equipment and modifications, which could affect the operation of the motorcycles rotating component systems.
- Inspect the easily accessible or visible components of the motorcycles rotating component systems for obvious damage or conditions, which could cause the symptom.
- Inspect the tire inflation pressures for the proper pressure.

Road Testing Procedure

⚠ CAUTION

Road test a motorcycle under safe conditions and while obeying all traffic laws. Do not attempt any maneuvers that could jeopardize the control of the motorcycle. Failure to adhere to these precautions could lead to serious personal injury and motorcycle damage.

Before the road test, ensure the following:

- The exterior lighting is working correctly.
- Tire pressure is correct.

During the road test:

- Perform the test only when traffic conditions permit.
- Operate the motorcycle in a controlled, safe manner.
- Observe all traffic regulations.
- Observe any unusual vibrations.
  - When braking
  - When coasting
  - When accelerating
  - When regen braking
- Observe any unusual sounds.
  - When braking
  - When coasting
  - When accelerating
  - When regen braking

Choose different road surfaces when test driving to verify that the condition is not related to road surfaces. Observe where the problem condition is located: Front, back or under the motorcycle. If the condition is something that is heard or felt, driving a similarly equipped motorcycle may determine if the issue is an operating characteristic of the motorcycle.

Warranty Information

Customer Assistance

Zero Motorcycles Inc. can be contacted via the contact methods listed below. Please have available the following, as it is essential to effectively and efficiently answer your questions or resolve your concerns.

- Owner's name and address
- Owner's telephone number
- Vehicle identification number (VIN)
- Date of purchase
- Power Pack serial number
- Motor serial number

An owner information chart is provided in the Zero Motorcycles Owner's Manual to record this information.

Zero Motorcycles Inc. can be contacted as follows:

Zero Motorcycles Inc.
380 El Pueblo Rd.
Scotts Valley, California 95066
USA

Phone: +1 (888) 786-9376
Monday-Friday
8am to 5pm Pacific Time

E-mail: support@zeromotorcycles.com.

For 24 hour updates and additional information about your motorcycle, visit the Owners Resources section of the Zero motorcycles website:

E-mail: service@zeromotorcycles.com.

Tire Pressure

⚠ CAUTION

Under-inflation is the most common cause of tire failure and may result in severe tire cracking, tread separation, "blowout," or unexpected loss of motorcycle control causing personal injury and possible death.

The tire pressure is checked using an accurate gauge when the tires are cold. This means that the tires have not been ridden on for 3 hours. Always replace the valve stem cap when finished.

Model	Front	Rear
S	32 psi (221 kPa)	34 psi (234 kPa)
DS	32 psi (221 kPa)	34 psi (234 kPa)
SR	32 psi (221 kPa)	34 psi (234 kPa)
DSR	32 psi (221 kPa)	34 psi (234 kPa)

Replacement Bulbs

Part	Number
Headlight Bulb	H4 (55/60 Watt)
Turn Signal Light Bulb (amber)	RY10W (10 Watt)
Brake/Tail Light	LED (replace the unit)
Front Running Light Bulb	W3W (3 Watt)

High Voltage Discharging

⚠ CAUTION

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed.

Failure to follow the procedures may result in serious injury or death.

- ***Verify that the high voltage has been discharged before working on or around high voltage components, wires, cables, or harnesses.***
- ***Remove all metal objects such as rings and watches.***
- ***Tighten the high voltage terminal fasteners to the specified torque. Insufficient or excessive torque will cause malfunctions or damage.***
- ***After finishing work on the high voltage system and before turning the key ON:***
  - ***Verify high voltage system integrity and that all connectors and covers are installed.***
  - ***Verify that all tools or loose components have been removed.***

⚠ CAUTION

Exposure to high voltage can cause shock, burns, and even death. The high voltage components on the motorcycle may only be serviced by technicians familiar with the circuit/system operation.

High voltage components are identified by labels. Do not remove, open, take apart, or modify these components. High voltage cable or wiring has orange covering. Do not probe, tamper with, cut, or modify high voltage cable or wiring.

Required Tools

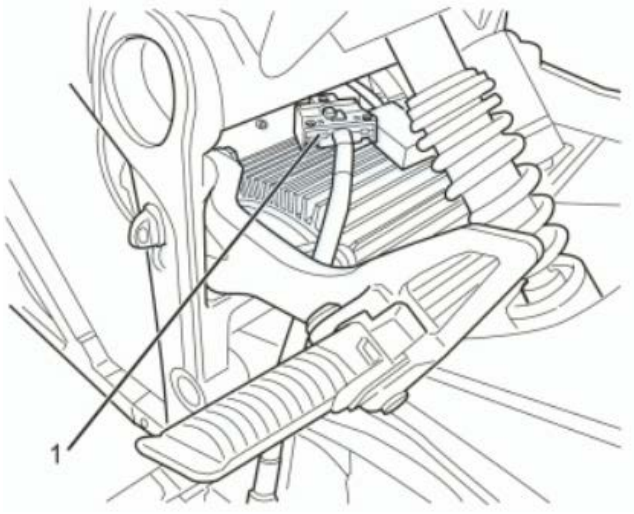


Zero0044

- PN 85-05665 Controller Discharge Tool

Discharge Procedure

1. Remove the key from the key switch.
2. If a charger is connected, disconnect.
3. Remove the fasteners in the upper rear corner of the right lower rubber cover.
4. Clean any dirt or debris away from the quick charge connector.



5. Remove the rubber cap from the brown Anderson connector and plug in discharge lamp (1).

⚠ WARNING

Use high-voltage gloves when plugging in.

6. To ensure that the discharge lamp itself and 100A charge fuse are intact, switch the ignition back on and make sure the lamp lights at least once.
7. Switch the ignition off and remove the key.

⚠ CAUTION

If the lamp does not turn off, stop working on the bike and contact Zero Customer Service.

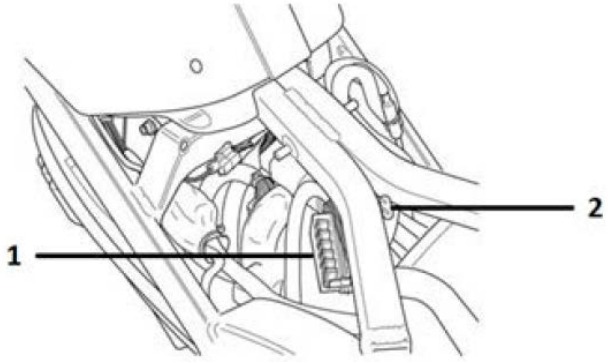
⚠ WARNING

Lock all keys away so the ignition cannot be switched back on.

8. Remove the low power B+ fuse as outlined in Low Voltage Fuses, page 10-2.
9. Use a voltmeter to measure voltage across the Anderson connector. If there is greater than 2 Volts, contact Zero Customer Service.

Low Voltage Fuses

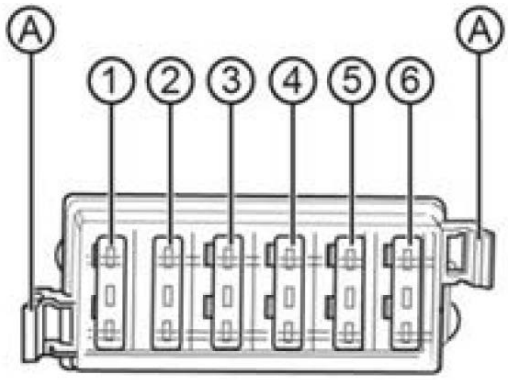
The 12 volt fuse center is located under the seat.



1. Fuse Center 2. ABS 12 Volt Fuse

To access the 12 volt fuse center:

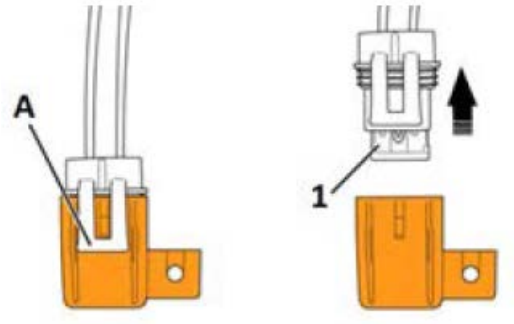
1. Remove two bolts securing the seat to the motorcycle frame.
2. Pull the seat rearward to gain access to the fuse center.
3. Squeeze the tabs (A) on the fuse center to remove the cover.
4. Replace the fuse(s).



Fuse Number	Amps	Circuits Controlled
1	5	ABS 4, Key
2	10	ABS 9, Valve
3	10	Headlight
4	10	Accessory
5	10	Flash lights, turn signals, horn, brake/ tail light
6	5	Dash, running Lights

To access the ABS 12 volt fuse:

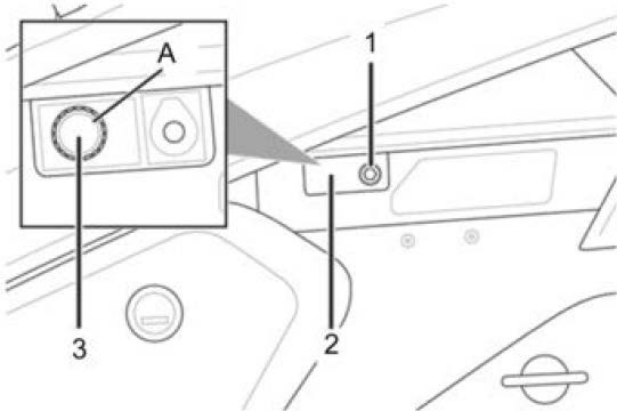
1. Remove two bolts securing the seat to the motorcycle frame.
2. Pull the seat rearward to gain access to the fuse.



3. Gently pull the tab (A) away from the red cap to release the fuse holder and pull upwards.
4. Replace the fuse.

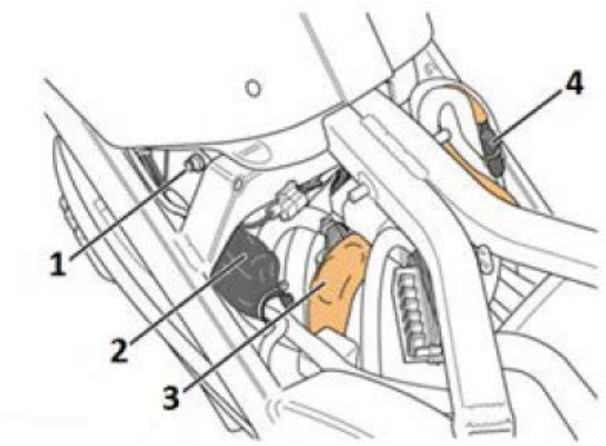
Fuse	Amps	Circuits Controlled
1	25	ABS-18 motor

To access the ZF7.2 power pack fuse:



1. Remove the bolt (1) securing the fuse cover.
2. Remove the fuse cover (2) to access the fuse.
3. Unscrew the fuse's cover (3).
4. Replace the fuse.
5. Screw on the fuse's cover and install the fuse

High Voltage Fuses



ZF14.4

Note: ZF14.4 illustrated. ZF7.2 similar except for fuse 1.

To access the high voltage fuses:

1. Remove the two bolts securing the seat to the motorcycle frame.
2. Pull the seat rearward to gain access to the fuses.
3. Pull back sheathing to access fuse holders (if necessary).
4. Unscrew the fuse's cover (1, 2, and 3).
5. Replace the fuse.

Fuse	Amps	Circuits Controlled
1	SPT3 15 A	Low power B+
2	ABC4A	Main bike board controller
3	ABC 4 A	DC/DC converter
4	100 A	Charge fuse (in-line)

Belt Inspection

Clean the belt with mild soap and water when washing the motorcycle. Towel dry and inspect for the following:

- Cuts or unusual wear patterns.
- Damage to the center of the belt.
- Outside edge beveling. Some beveling is common but it indicates that sprockets are misaligned.
- Outside ribbed surface for signs of stone puncture.
- Inside (tooth portion) of belt for exposed tensile cords normally covered by nylon layer and polyethylene layer. This condition will result in belt failure and indicates worn sprocket teeth.
- Signs of puncture or cracking at the base of the belt teeth.

If any of the above conditions are found, the belt should be replaced.

Belt Tension Check- Gates® Carbon Drive™ Smartphone Application

Required Tools

- Smart Phone with Gates Carbon Drive Application Installed
- 3 mm hex wrench
- 27 mm socket and socket wrench
- 13 mm wrench

Tension Checking Procedure

Belt Pitch	Recommended Tension Range
11 mm	42.5 - 73.6 Hz

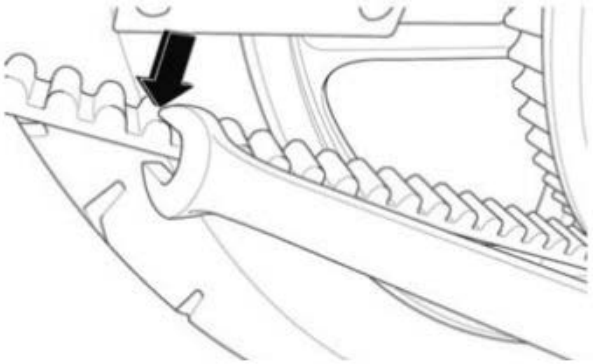
The drive belt tension can be checked by using the Gates® Carbon Drive™ Smartphone application, which measures belt tension frequency. The application is available for free to download at both the Apple iTunes® store and Google Play® store. iTunes® is a registered trademark of Apple. Google Play® store is a registered trademark of Google. Note: Perform belt frequency measurement on the lower belt span, close to the center (between the sprockets). Note: The application works best in a quiet environment.

Note: The following application instructions may differ between phones.

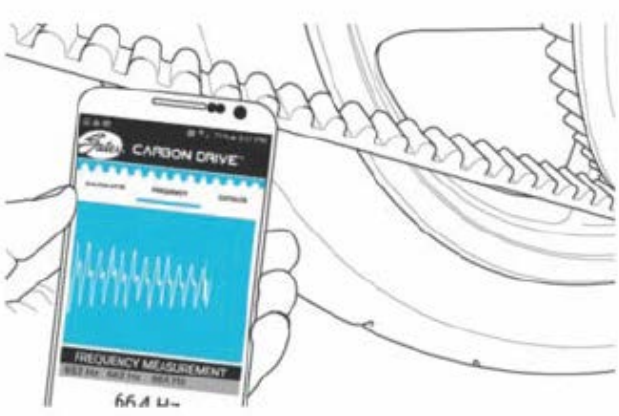
1. Remove the key from the key switch.

Note: The location of the swingarm ground strap and brake line clips, before removing the rear fender.

2. Remove the four bolts securing the rear fender to the swingarm, and remove the fender.
3. From the application, click the tension icon and measure.
4. Confirm the phone's microphone is on (if applicable).
5. Hold the phone, so the microphone is as close to the drive belt as possible (without touching the belt).



6. Pluck the belt with your thumb or a wrench (as shown) so that it vibrates like a guitar string.



7. The microphone will measure vibration's frequency.
8. Rotate the rear wheel a quarter-turn and repeat the frequency measurement.
9. Compare your belt's frequency readings to the recommended range values (see chart above).
10. If the tension is not within specification, the belt will need to be adjusted. Refer to Belt Adjustment Procedure, page 10-5.

Belt Tension Check- Tension Tester Tool

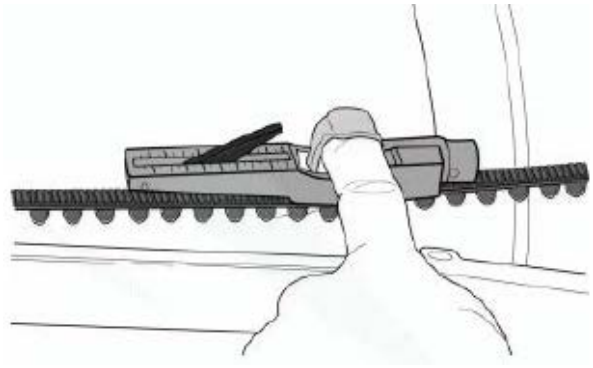
Tension Checking Procedure

Required Tools

- Belt Tension Tester
- 3 mm hex wrench
- 27 mm socket and socket wrench
- 13 mm wrench

The tension tester has a plastic measurement arm, located in a slot. Along this slot there is a measuring scale. The point of intersection of the measurement arm and the measuring scale shows the tension of the belt. There is a button (clicking pad) on the upper side of the Tension Tester, where you can secure your finger with a rubber band holder. A spring is located underneath this clicking pad. If a certain pressure is applied to the spring, it makes a clicking sound.

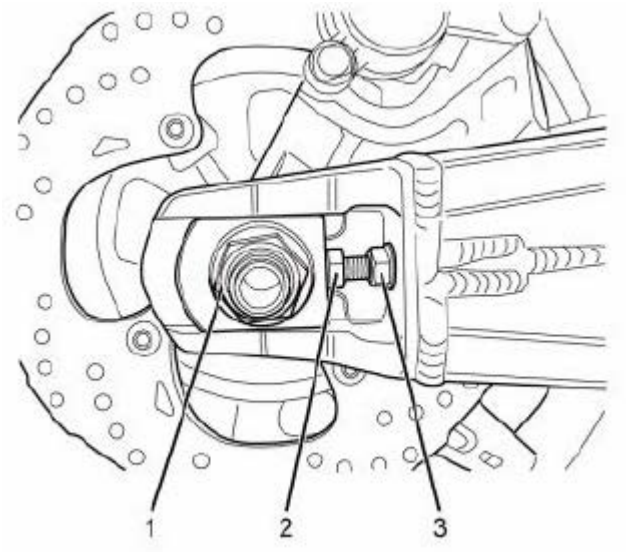
1. Remove the key from the key switch.



2. Press the tension tester steadily to the middle of the upper side of the belt. The “lip” will lead the tester to the belt.
3. Slowly increase the pressure on the tester, until you hear a clicking sound. Do not increase the pressure after the tester has clicked.
4. Remove the tester carefully from the belt. Avoid rough movements of the tester, as this would change the results of the measurement. The measurement should be in the range of 55 - 169 lb. (25 - 77 kg).
5. If the tension is not within specification the belt will need to be adjusted. Refer to Belt Adjustment Procedure, page 10-5.

Belt Adjustment Procedure

1. Remove the four bolts securing the rear fender to the swingarm, and remove the fender.



2. Loosen the rear axle shaft nut (1).
3. Loosen jam nuts (3), adjust the belt tension by turning axle adjusters (2). Turn an equal number of turns to keep the wheel aligned until the specification is achieved.
4. Tighten jam nuts (3).
   - Tighten to 19 lb-ft (26 Nm)
5. Apply Loctite® 242® to the threaded portion of the axle and tighten the axle shaft nut.
   - Tighten to 75 lb-ft (102 Nm)
6. Road test the motorcycle. Refer to Road Testing Procedure, page 1-12.
7. Recheck the belt for proper tension adjustment after the test ride and readjust if necessary.
8. Install the fender onto the swingarm.

Brake Pad/Rotor Inspection

Brake Pad Inspection

The brake pads must be inspected when specified in the maintenance schedule. Visually inspect the brakes by looking at the remaining brake pad material through the sides of the brake caliper.

Replace the brake pads if either pad's thickness is 0.053 in (1.35 mm) or less. If the brake pads are worn, replace both brake pads immediately.

Brake Disc Inspection

The thickness of the brake discs should be checked regularly. The minimum thickness is 0.15 in (3.85 mm).

Diagnostic Trouble Code (DTC) List

The numeric error code displayed on the LCD instrument panel provides diagnostics into errors that the Main Bike Board (MBB) has set. These can be useful for troubleshooting issues and determining next steps for solving technical issues.

Retrieving Error Codes

Adjust Button (ADJ): By momentarily pressing or holding the ADJ button (1) you can reset fields and toggle through the trip menus and display options.

Select Button (SEL): By momentarily pressing or holding the SEL button (2) you can reset or select fields in Display A and Display B, change the time, and change the display units.



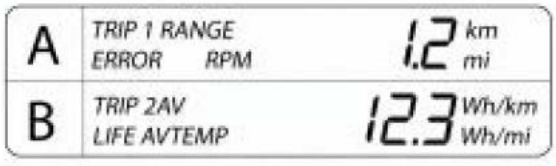
Display A

To select Display A with the dash in its normal operating mode, momentarily press the SEL button once. Press the ADJ button to toggle through the following fields:

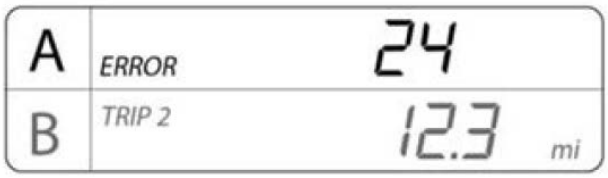
- Trip 1 Odometer - Displays individual trip mileage and is reset by pressing and holding the ADJ button for 2 seconds.

Note: Trip 1 is reset each time the battery is recharged to 100%.

- Range - Displays remaining battery power based on learned riding style and usage.
- Error - Displays 2-digit error codes for dealer use.
- RPM - Displays motor rpm.



If an error code has been recorded, it can be retrieved from the dash Display A.



Note: If code 57 is retrieved, your motorcycle may only require recharging

DTC	Description
0	No Error
1	High Throttle
2	Motor Temperature Warning Stage 1
3	Motor Temperature Warning Stage 2
4	Controller Temperature Warning Stage 1
5	Controller Temperature Warning Stage 2
6	Throttle Enable Wire Error
7	Low Battery Voltage
8	High Battery Temperature Status
9	Low Battery Temperature Status
10	Battery Temperature Warning Stage 1
11	Battery Temperature Warning Stage 2
12	Reserve Partition Warning
13	Reserve Switch Warning
14	Safety Override Active
15	Charger Attached But Not Charging
16	CIB Contactor Compromised
17	Charger Error
18	Battery Temperature Sensor Fault
19	High Charge Current
20	BMS Low Isolation
21	Board Vpack Error
22	Board Temperature Error
23	Post Error
24	Startup Error
25	Contactor Open Warning

DTC	Description
26	Contactor Welded Error
27	Precharge Error
28	BMS Isolation Fault
29	BMS Isolation Danger
30	BMS CAN Error
31	Sevcon CAN Error
32	Module Variance Too High
33	Sevcon Error Turn Off
34	Charge Error Turn Off
35	Loopback Error
36	Board 5V Error
37	Board 3 3V Error
38	Idle Turn Off
39	Throttle Out Of Range Disable
40	BMS Throttle Enable Wire Disable
41	Low Battery Voltage Disable
42	High Battery Temperature Status Disable
43	Low Battery Temperature Status Disable
44	Kill Switch Disable
45	Kickstand Switch Disable
46	BMS Charger Connected Disable
47	MBB Charger Connected Disable
48	Sevcon Startup Disable
49	Contactor Open Disable
50	BMS Self Test Error
51	BMS Self Test Warning
52	Reserve Partition Disable
53	BMS Internal Disable
54	Internal Disable Error
55	Internal Fault Error
56	Monolith Not Connected
57	Module Did Not Connect
58	BMS Sensor Warning
59	BMS System Warning
60	Bike Configuration

Note: If code 57 is retrieved, your motorcycle may only require recharging.

Power Pack Replacement

⚠ WARNING

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed.

⚠ CAUTION

Important: The power pack is heavy. Use proper lifting equipment when moving the power pack.

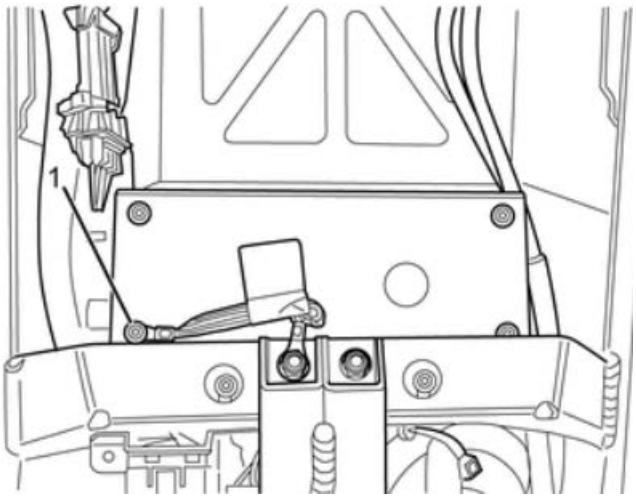
Note: The power pack serial number is located on the upper front left of the power pack.

Required Tools

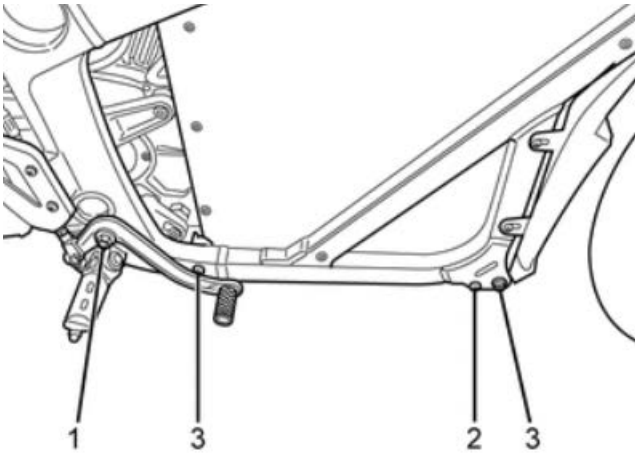
- 3 mm hex wrench
- 5 mm hex wrench
- 6 mm hex wrench
- Philips screwdriver
- 15 mm wrench

Removal

1. Discharge the High Voltage system. Refer to High Voltage Discharging, page 10-1.
2. Remove the power pack charger. Refer to BMS Replacement, page 20-5.
3. Remove the seat.
4. Remove the front fender.
5. Remove the tank assembly.
6. Disconnect C96 power pack connector from the bottom of the plastic protrusion at the rear of the power pack.



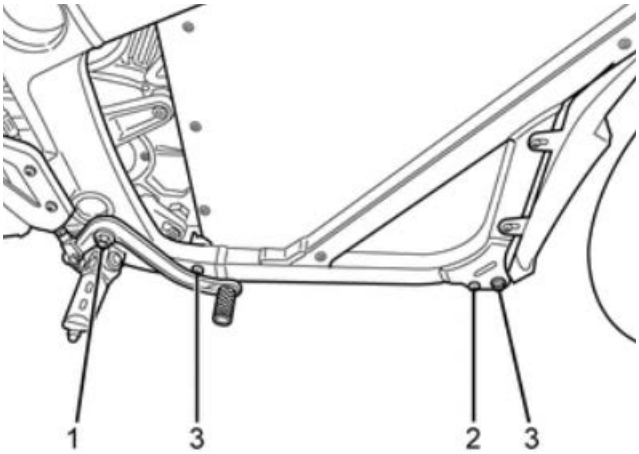
7. Remove the ground strap bolt (1) and ground strap.
8. Remove horn and the horn bracket from the frame.
9. Remove the rear brake pedal pivot bolt (1), and move pedal out of the way of the power pack bolt.



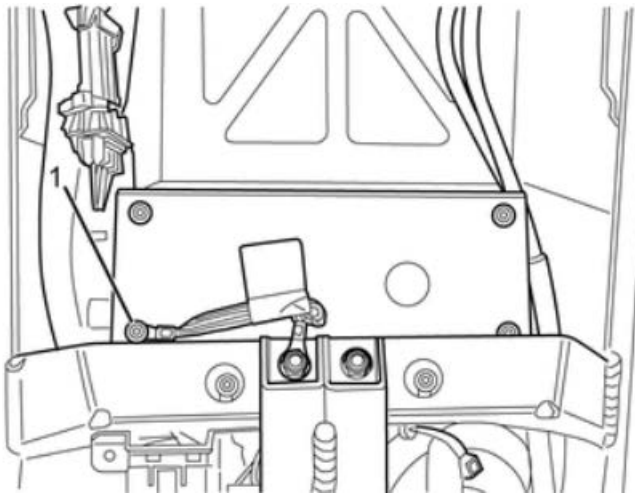
10. Remove the right side lower fairing panel bolt and bracket (2), remove the left side bolt and bracket.
11. Remove and discard any zip ties that are securing harnesses or other items to the power pack.
12. Support the bottom of the power pack using wooden block or similar.
13. Remove the right power pack to frame bolts (3), remove the left power pack to frame bolts.
14. With the aid of an assistant, lift the frame off of the power pack.

Installation

1. Place power pack assembly onto the wooden blocks or similar.
2. With the aid of an assistant, lift the frame onto the power pack.



3. Install the right power pack to frame bolts (3), install the left power pack to frame bolts.
   - Tighten to 20 lb-ft (27 Nm)
4. Install the right side lower fairing panel bolt and bracket (2), install the left side bolt and bracket.
5. Position the rear brake pedal and install the pivot bolt (1) and tighten.
   - Tighten to 20 lb-ft (27 Nm)
6. Install the horn bracket and horn onto the frame.
7. Connect power pack connector C96.



8. Install the ground strap and ground strap bolt (1).
9. Install any zip ties that were removed.
10. Install the tank assembly.
11. Install the front fender.
12. Install the seat.
13. Install the power pack charger. Refer to BMS Replacement, page 20-5.

Power Pack Replacement (Long Brick)

WARNING

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed.

CAUTION

The power pack is heavy. Use proper lifting equipment when moving the power pack.

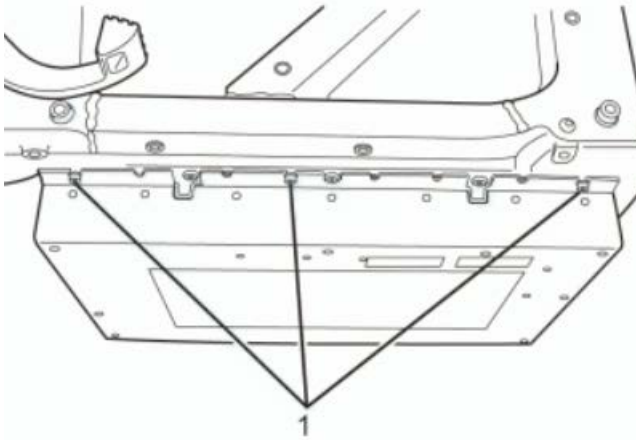
Note: The Power Pack serial number is located on the upper front left of the power pack.

Required Tools

- 3mm hex wrench
- 6mm hex wrench
- 10mm hex wrench
- Philips screwdriver
- 15mm wrench

Removal

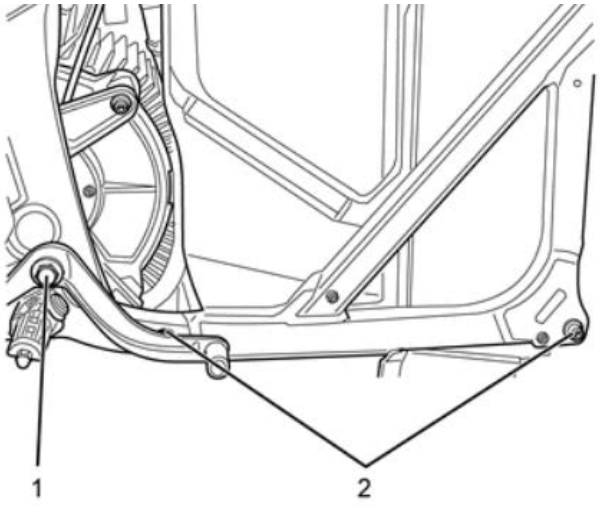
1. Discharge the High Voltage system. Refer to High Voltage Discharging, page 10-1.
2. Remove the right and left lower faring panels.
3. Remove the center fairing panel.
4. Remove the skid plate.



5. Loosen the 3 screws (1) securing the charger to the frame.
6. Remove the 3 screws from the opposite side of the charger and lower the charger, move that charger toward the back of the motorcycle.
7. Remove the seat.
8. Remove the tank assembly.



9. Remove the top support bolt (1).
10. Remove horn and the horn bracket from the frame.
11. Remove and storage area door.

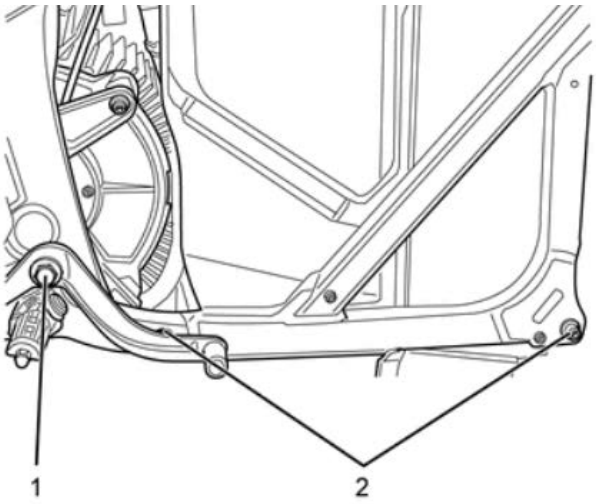


12. Remove the rear brake pedal pivot bolt (1), and move pedal out of the way of the power pack bolt.
13. Support the bottom of the power pack using a jack or similar.
14. Remove the right power pack to frame bolts (2), remove the left power pack to frame bolts.
15. Lower the jack enough to disconnect the C456 connector from the top of the power pack.
16. With the aid of an assistant, lift the frame off of the power pack.

17. Carefully lay the power pack on its side and remove the 4 screws securing it to the bottom mount.

Installation

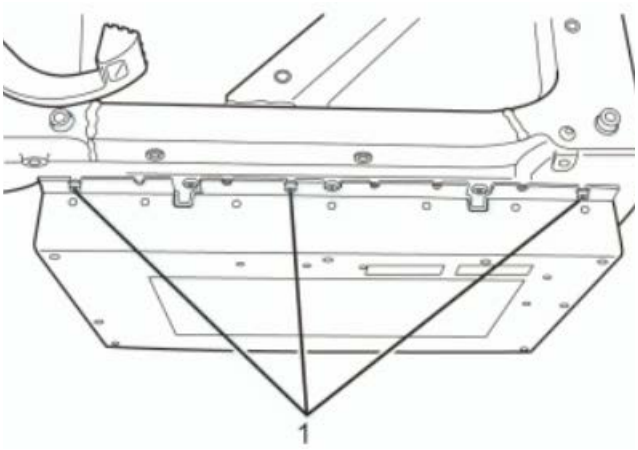
1. Install the mount and 4 screws onto the power pack.
2. Place power pack assembly onto a jack or similar.
3. With the aid of an assistant, lift the frame onto the power pack.
4. Connect the C456 connector at the top of the power pack
5. Carefully jack the power pack into position.



6. Install the right power pack to frame bolts (2), install the left power pack to frame bolts.
7. Position the rear brake pedal and install the pivot bolt (1) and hand tighten.
   - Tighten to 20 lb-ft (27 Nm)
8. Install the horn bracket and horn onto the frame.



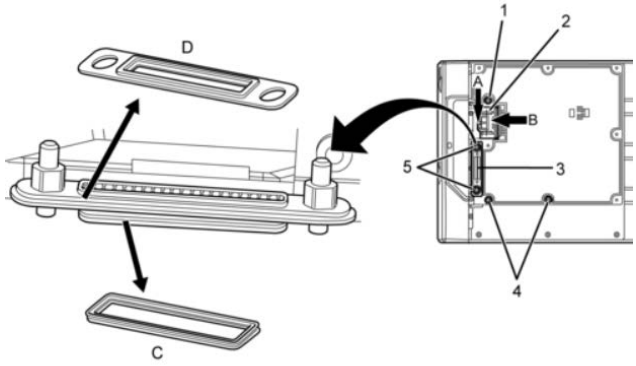
9. Install the top support bolt (1).
   - Tighten Power Pack bolts to 20 lb-ft (27 Nm)
10. Install the tank assembly.
11. Install the seat.



12. Slide the charger onto the loosened screws (1) and install the opposite side screws.
13. Tighten all the charger screws.
14. Install the skid plate.
    - Tighten to 7 lb-ft (9 Nm)
15. Install the center fairing panel.
16. Install the storage area door.
17. Install the right and left lower fairing panel.

BMS Replacement

The BMS is located inside the power pack, behind the front power pack cover.



Required Tools

- Computer with Diag4Zero installed
- 3mm Hex wrench
- 86-08084 Diag4Zero VCI Module
- 86-08083 Diag4Zero Motorcycle Cable Set

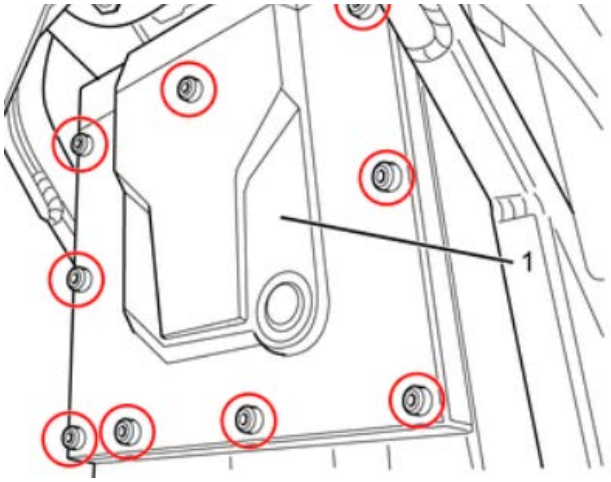
Removal

⚠ CAUTION

Remove the B+ fuse before removing the BMS board.

1. Remove the right and left lower fairing panels.
2. Remove the horn and bracket.
3. Remove the center fairing panel.

Note: Clean/remove and dirt or water from the front of the power pack cover prior to removal.

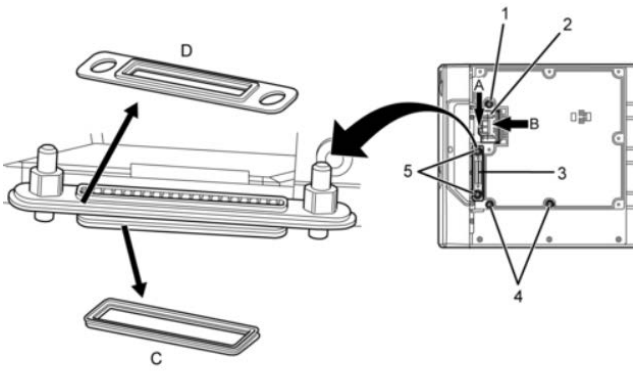


4. Remove the 9 screws from the front of the power pack, and carefully remove the front cover (1). There may be some resistance caused by the cover sealant.
5. Disconnect the connector (2) on the upper edge of the board by pressing in retaining tab (A) then pushing up (B) on the connector.
6. Remove the screw (1) with an external tooth washer.
7. Remove the two cell-tap nuts (5) from the BMS.
8. Remove the socket head screws (4) holding the board to the battery.
9. Gently pull out on the cell-tap connector (3) on the upper edge of the BMS, while supporting the BMS board.
10. Ensure that the cell-tap connector upper gasket (D) and lower gasket (C) are in place and not stuck to the old BMS board.

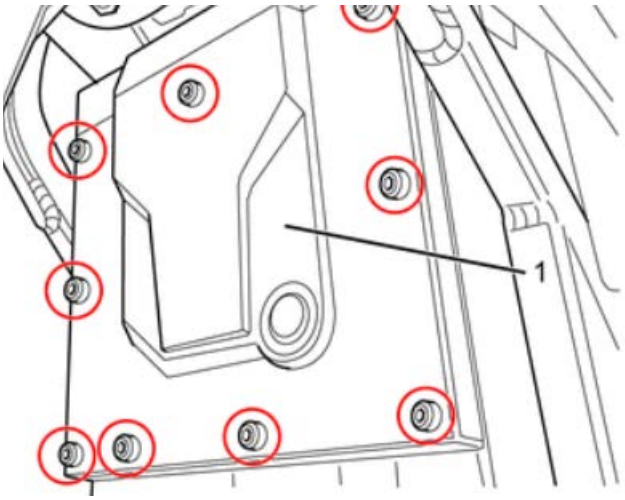
Installation Procedure

⚠ CAUTION

Do not reinstall the B+ fuse until the BMS is fully connected and mounted.



1. Ensure that the lower gasket (C) and upper gasket (D) are in place.
2. Press down on white cell-tap connector (3) while supporting the rest of the board to ensure the BMS goes in straight.
3. Press down on connector (2) on left side of BMS while supporting the other side. An audible click will be heard when the connector is fully engaged.
4. Replace the socket head screws (4) holding the BMS in place.
5. Replace the screw (1) with the external tooth washer in the location shown.
6. Replace the 2 cell-tap nuts (5) and tighten.



7. Install the power pack front cover (1) and install the 9 screws.
8. Install the center fairing panel.
9. Install the horn and bracket.
10. Install the right and left lower fairing panels.
11. Configure the BMS as outlined in BMS Configuration, page 20-7.

BMS Configuration

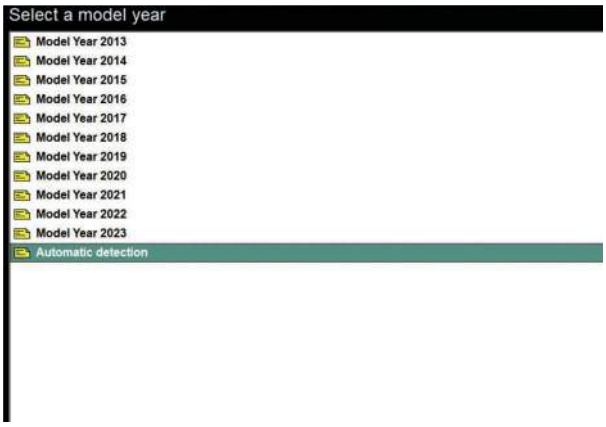
Required Tools

- Computer with Diag4Zero Installed
- 86-08084 Diag4Zero VCI Module
- 86-08083 Diag4Zero Motorcycle Cable Set

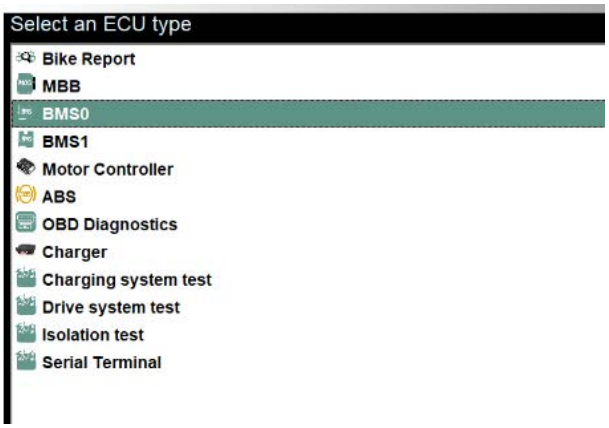
1. Plug-in to the motorcycle's OBDII port using the Diag4Zero Cable.
2. Open Diag4Zero.



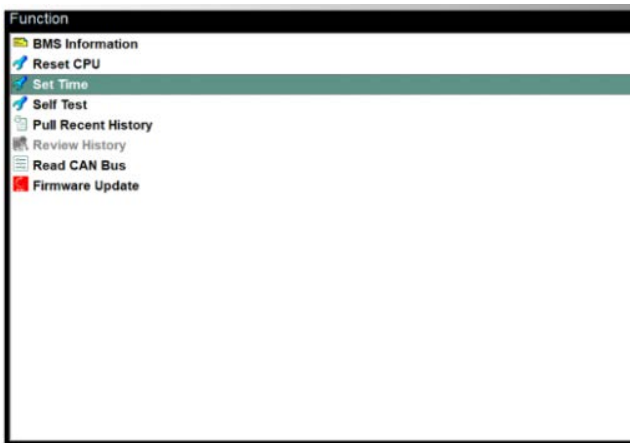
3. In Diag4Zero, select the Troubleshooting Menu.



4. Select the appropriate Model Year and Model or use Automatic Detection.



5. Click on BMS0 (If a Power Tank BMS is being configured, click on BMS1).



6. Click on the 'Set Time' button, and wait for the pop-up verifying the time setting.

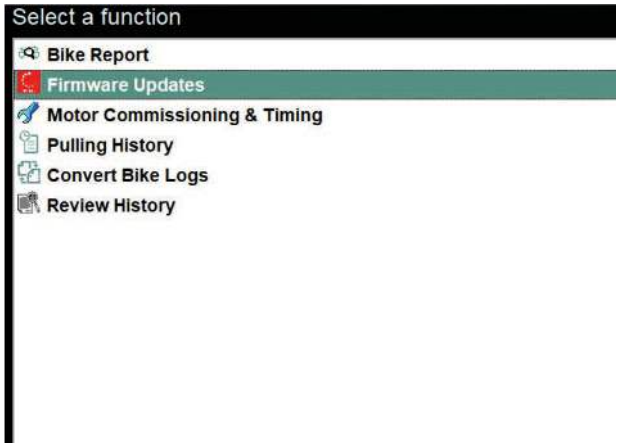
Checking and Updating Firmware (MBB and BMS)

This procedure is used to check the firmware revision, pull diagnostic logs, and update individual systems or all systems through one diagnostic port. This greatly reduces the chance of loading non-current firmware, and saves time by going to one location on the motorcycle and one system to perform the update and retrieve the different logs. The new diagnostic interface is called “Zero Diagnostics Utility” or ZDU. Currently you can run a version check of firmware for all the components (MBB and BMS), and then update them as needed. You can also pull MBB and BMS logs and zip them to a folder for fast emailing to Zero Technical Support for analysis.

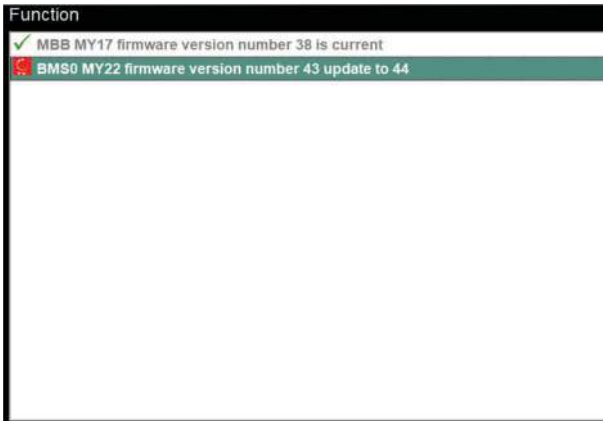
1. Connect the motorcycle to Diag4Zero and turn the key on.
2. Double click the Diag4 icon.



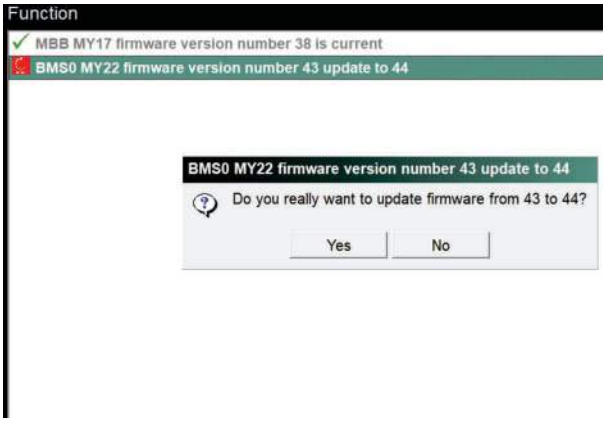
3. Select “Maintenance”.



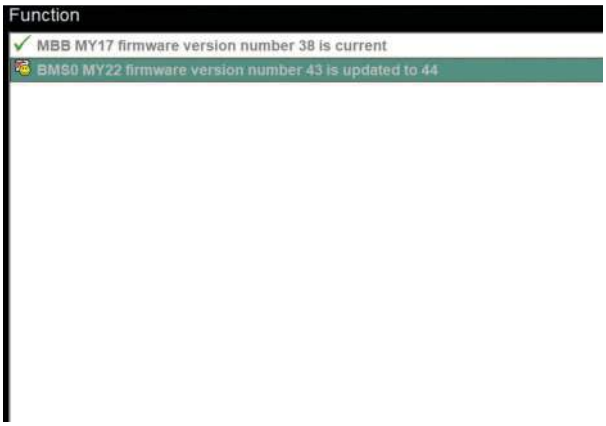
4. Select “Firmware Updates”.



5. Update any firmware that has an update available.



6. Select “Yes” to confirm the update..
7. Once complete, select “Ok” and exit.



8. Confirm the menu shows the firmware has been updated, then exit.

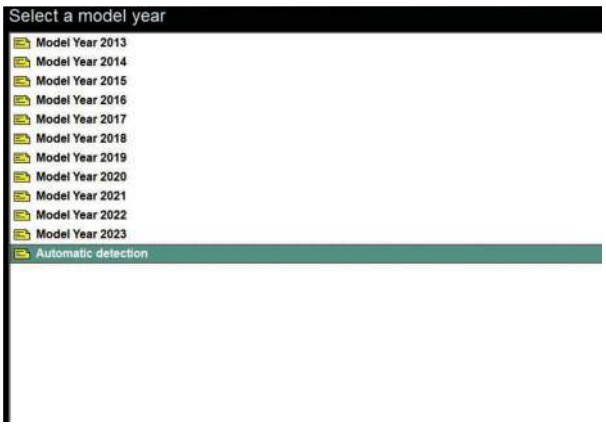
MBB/BMS Interface

The MMB/BMS Interface function can be used for diagnostic troubleshooting. The screen provides information such as statistics, inputs/outputs, event and error logs, etc.

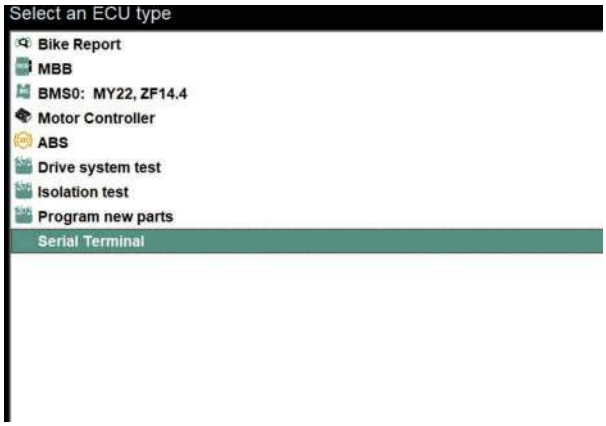
1. Connect the motorcycle to Diag4Zero and turn the key on.
2. Double click the Diag4 icon.



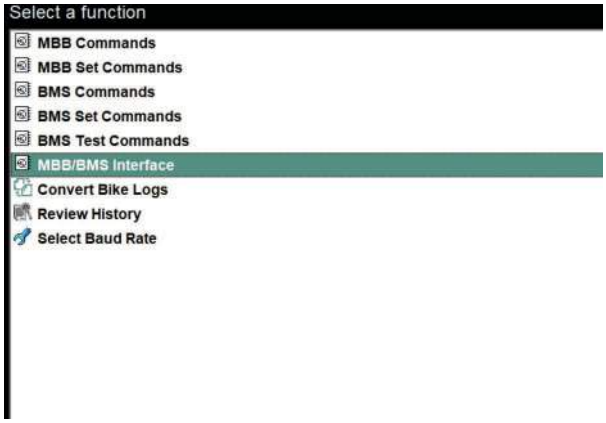
3. Select “Troubleshooting”.



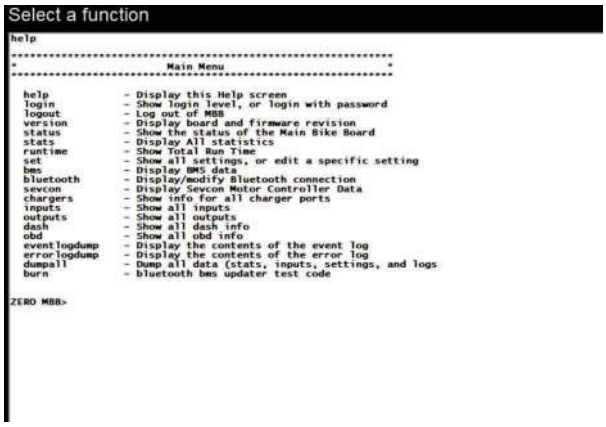
4. Select the model year or select “Automatic detection”.



5. Select “Serial Terminal”.



6. Select “MBB/BMS Interface”.



7. Type the command for the function you are testing.

DC/DC Converter Replacement

WARNING

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

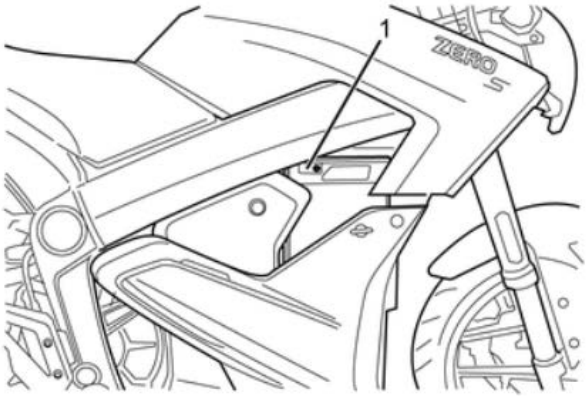
Required Tools

- 3 mm hex wrench
- 4 mm hex wrench
- 5 mm hex wrench
- 10 mm wrench
- Philips screwdriver
- PN 85-05665 Controller Discharge Tool

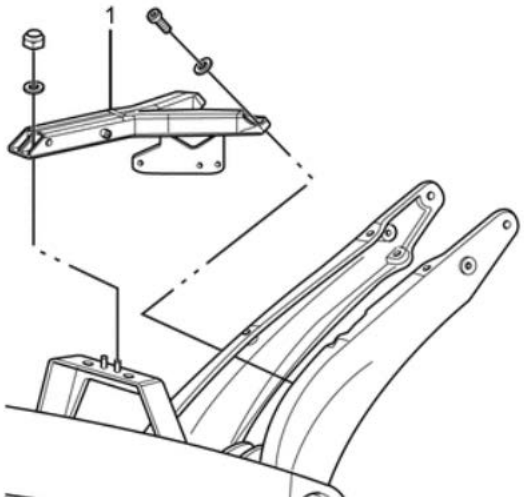
Note: Mark the location and routing of all wires and cables prior to removal.

Removal

1. Discharge the high voltage system. Refer to High Voltage Discharging, page 10.1.
2. Remove the seat.

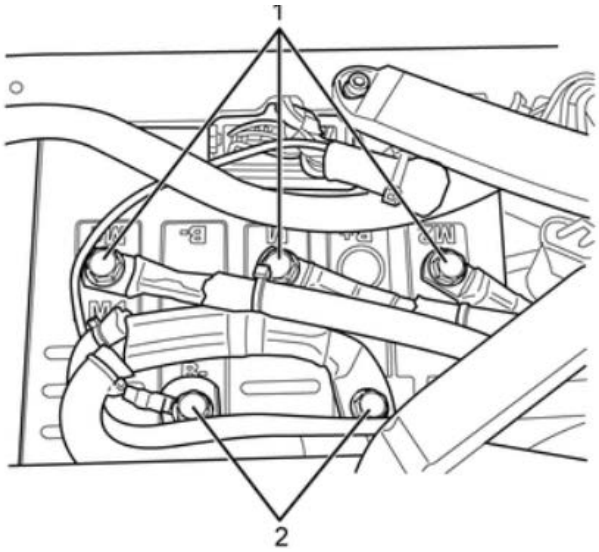


3. Remove the low voltage B+ fuse (1).
4. Remove the front fender.
5. Remove the tank assembly.

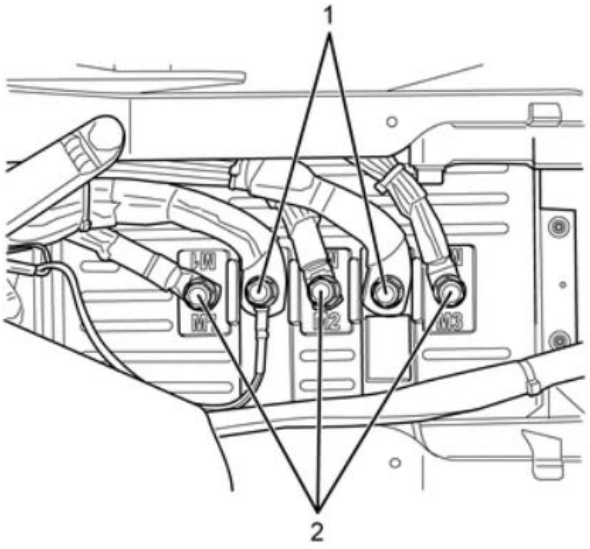


6. Remove the upper frame/fuse center bracket (1), and set aside. Note: Leave the wiring connected to the fuse center.
7. Disconnect the C1 11 kW or C1 except 11 kW and C2 11 kW or C2 except 11 kW MBB harness connectors.
8. Remove the motor controller cover retaining screws and cover. Mark the location of motor controller cable bolts prior to removal.
9. Remove the controller cable bolts (1,2) and remove the cables.

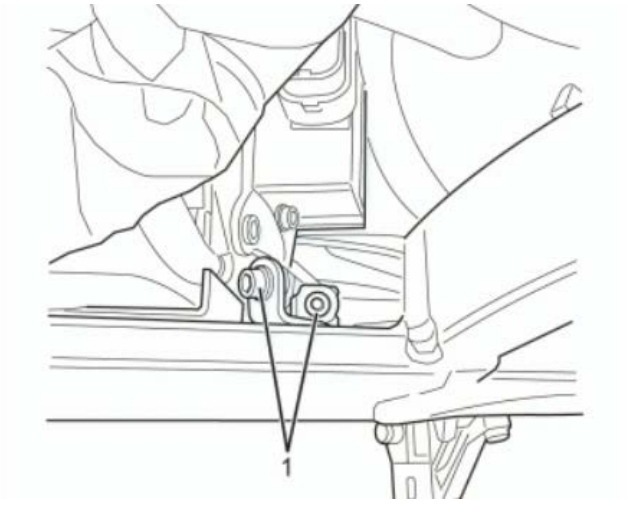
Size 4:



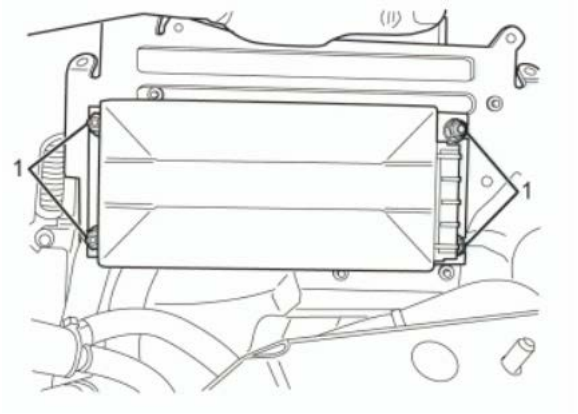
Size 6:



10. Remove the rear ABS harness mounting bracket from the bottom of the module bracket.
11. Remove the screws securing the C3 11 kW or C3 except 11 kW data link connector from the bottom of the module bracket.
12. Remove the screws securing the C50 11 kW or C50 except 11 kW quick charge connector from the bottom of the module bracket.
13. Disconnect the C14 11 kW or C14 except 11 kW Motor Harness to the Chassis Harness connector.

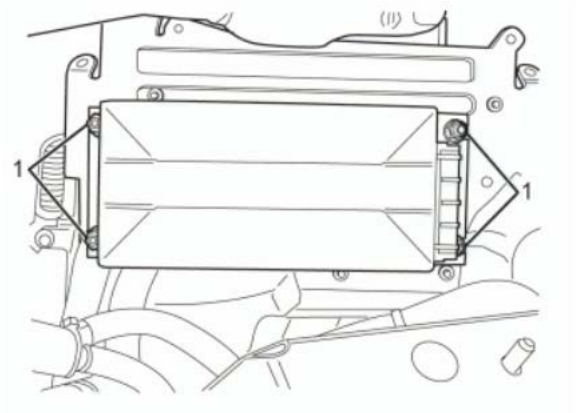


14. Remove the 2 left side module bracket bolts (1) and the right side module bracket bolts.
15. Carefully moving harnesses out of the way, pull the module bracket up enough to disconnect the C08 DC/DC converter harness connector.

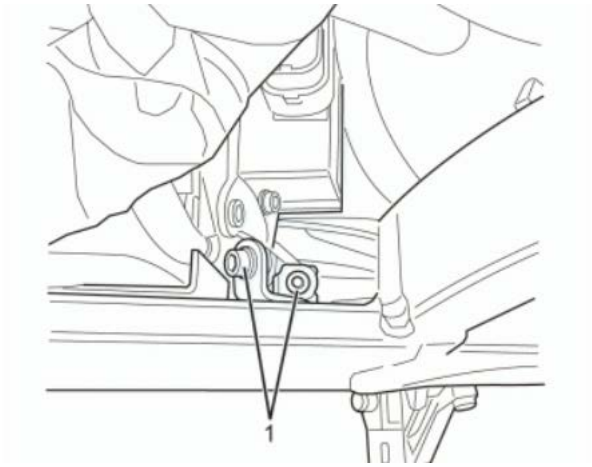


16. Remove the 2 bolts (1) securing the DC/DC Converter to the module bracket and remove the DC/DC Converter.

Installation

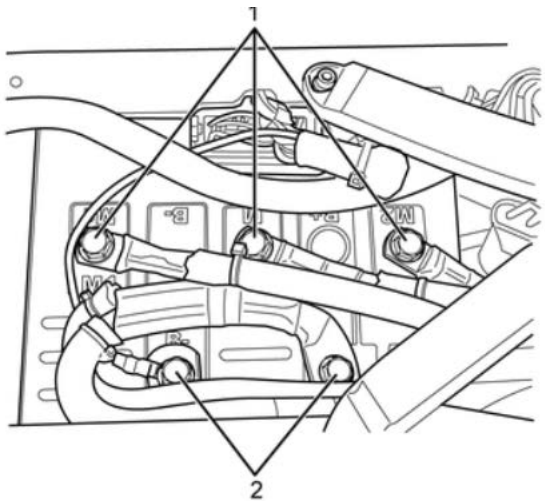


1. Install the DC/DC converter onto the module bracket and install the nuts (1).
   - Tighten to 8 lb-ft (11 Nm)
2. Slide the module bracket into position and connect the C08 DC/DC converter harness connector.

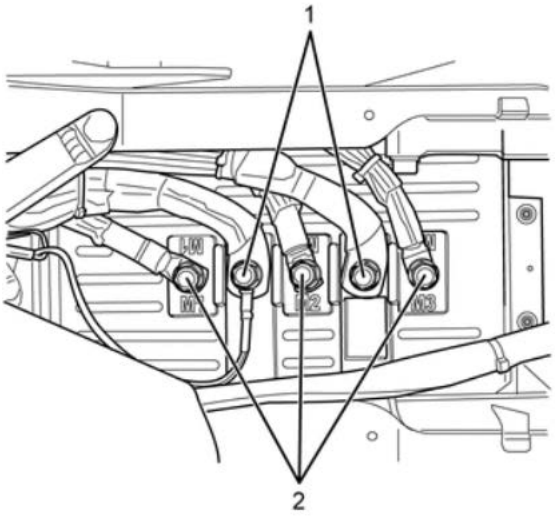


3. Install the 2 left side module bracket bolts (1) and the right side module bracket bolts.
   - Tighten to 5 lb-ft (7 Nm)
4. Install the screws securing the C50 quick charge connector onto the bottom of the module bracket.
5. Install the screws securing the C3 data link connector onto the bottom of the module bracket.
6. Install the rear ABS harness mounting bracket onto the bottom of the module bracket.
7. Connect the C14 Motor Harness to the Chassis Harness connector.
8. Install the cables and bolts (1,2) in the same locations and routings as removed.
   - Tighten to 9 lb-ft (12 Nm)

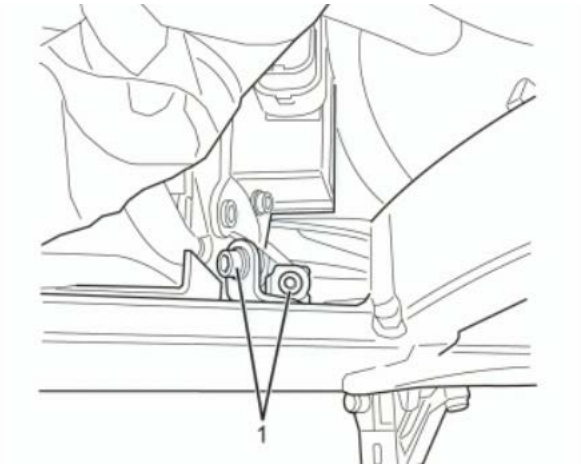
Size 4:



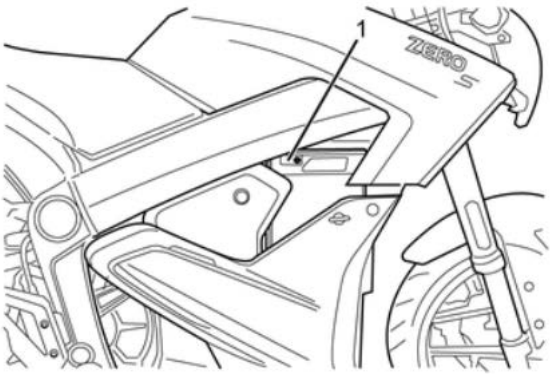
Size 6:



9. Install the controller cover and cover retaining screws.
10. Connect the C90 motor controller connector.
11. Connect the C01 and C02 MBB harness connectors.



12. Install the upper frame/fuse center bracket (1), and tighten the nuts.
    - Tighten to 7 lb-ft (9 Nm)
13. Install the tank assembly.
14. Install the front fender.



15. Install the low voltage B+ fuse (1).
16. Install the seat.

Power Pack Charger Replacement

⚠WARNING

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

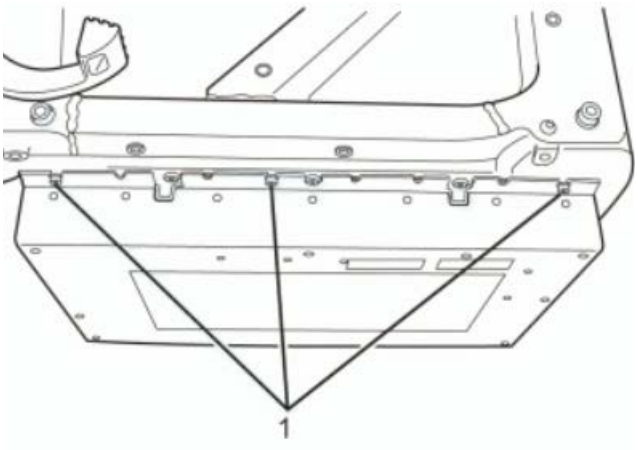
Required Tools

- Philips screwdriver
- 3mm hex wrench
- PN 85-05665 Controller Discharge Tool

Removal

Note: Mark the location of all wires and cables prior to removal.

1. Discharge the High Voltage system. Refer to High Voltage Discharging, page 10.1.
2. Remove the right and left lower faring panels.
3. Remove the center fairing panel.
4. Remove the skid plate.
5. Disconnect the C306 and the C307 on-board charger connectors.
6. Remove any harness clips or zip ties.
7. Using a long screw driver, remove the 2 screws securing the AC plug connector to the frame.



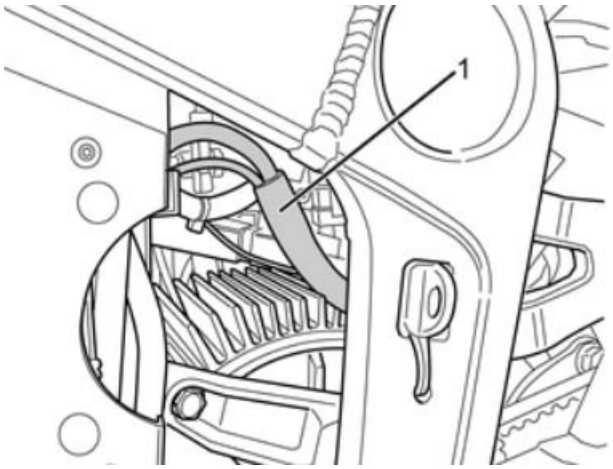
8. Loosen the 3 screws (1) securing the charger to the frame.
9. Remove the 3 screws from the opposite side of the charger and remove the charger.

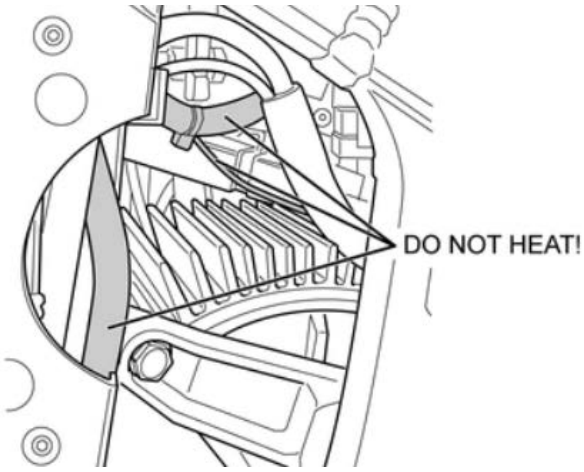
Installation



Note: Prior to installation of the charger verify that the zip tie (1) is installed on the cable. If not follow steps 1 through 4 before install the charger on the motorcycle. The below instructions are shown with the AC cable installed on the motorcycle off motorcycle installation is similar.

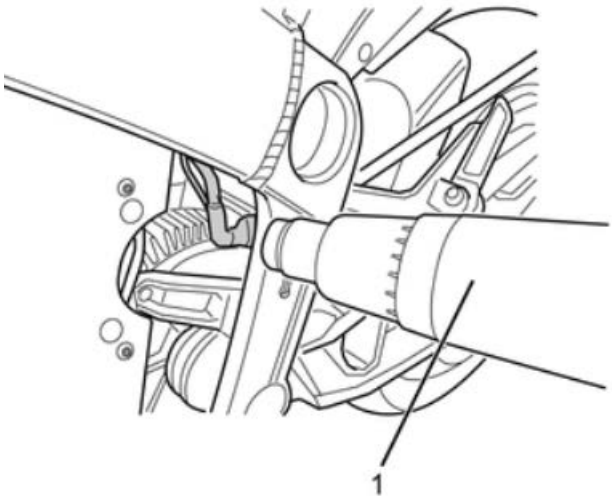
Note: The installed location of the AC inlet cable (1) is highlighted below.





⚠ CAUTION

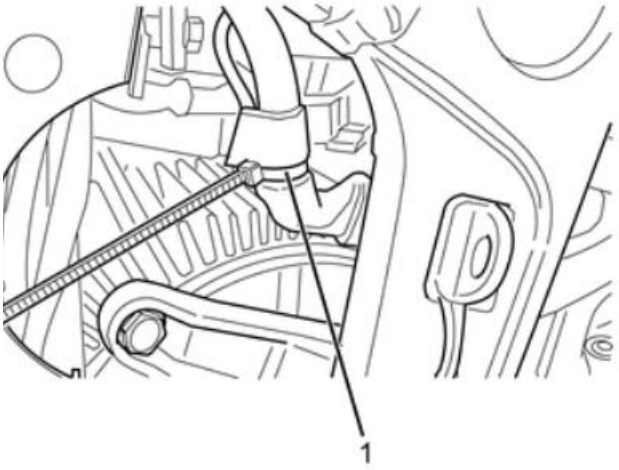
DO NOT damage the ABS connector or any of the cabling around the battery when applying heat to this area.



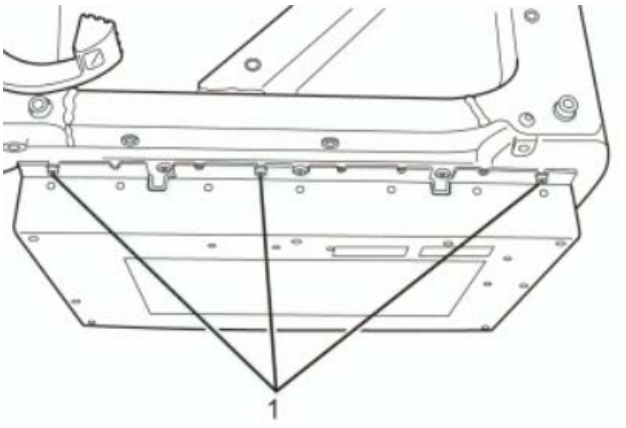
1. Using a heat gun (1) on the LOW setting to begin. Evenly apply heat to the AC inlet heat shrink covering. Move the heat gun around the heat shrink covering until the internal adhesive becomes gooey. If necessary, increase the temperature setting on the heat gun to ensure that the adhesive is liquefying.

⚠ CAUTION

The heat shrink covering will be uncomfortable to the touch at this point, be careful when applying the zip tie.



2. When the adhesive is shiny and appears liquefied, apply a zip tie (1) around the center of the heat shrink covering.
3. Cinch the zip tie until the heat shrink covering bulges slightly around the center.
4. Clip the zip tie tail using flush cut pliers.



5. Slide the charger onto the loosened screws (1) and install the opposite side screws.
6. Tighten all the charger screws.
   - Tighten to 12 lb in. (1.4 Nm)

Note: Prior to connecting the charger connectors coat the terminals with CP70 dielectric grease.

7. Route and connect the C306 and the C307 on-board charger connectors in the same locations as removed.
8. Install the AC plug connector onto the frame.
9. Install any clips or zip ties that secure the harness.
10. Install the skid plate.
    - Tighten to 7 lb-ft (9 Nm)
11. Install the center fairing panel.
12. Install the right and left lower fairing panel.

Power Tank Replacement

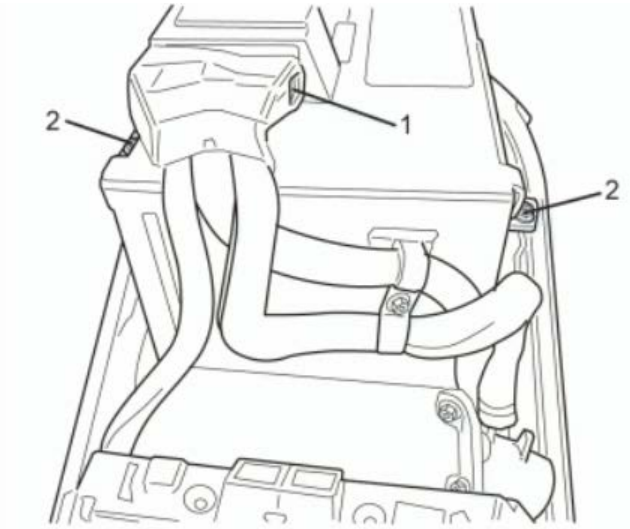
Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed.

Required Tools

- 3 mm hex wrench
- 5 mm hex wrench
- Philips screwdriver

Removal

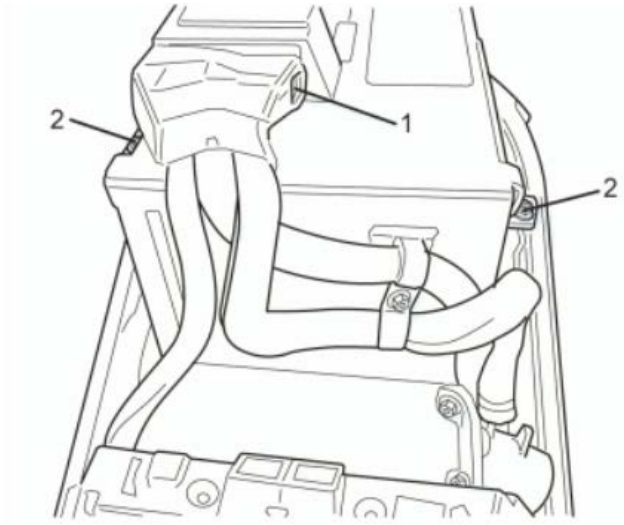
1. Disable the High Voltage system. Refer to High Voltage Discharging, page 10.1.
2. Remove the seat.
3. Remove the front fender.
4. Remove the tank assembly.



5. Disconnect power tank C366 and C367 connector (1).
6. Remove the nuts and washers (2) from the hook bolts.
7. Remove the power tank hold down and remove the power tank.

Installation

1. Install the power tank into the frame.
2. Install the power tank hold down through the hook bolts.



3. Install the hook bolt washer and nuts (2) for both sides.
   - Tighten to 4 lb-ft (5 Nm)
4. Connect the power tank C366 and C367 connector (1).
5. Install the tank assembly.
6. Install the front fender.
7. Install the seat.

Drive Belt Replacement

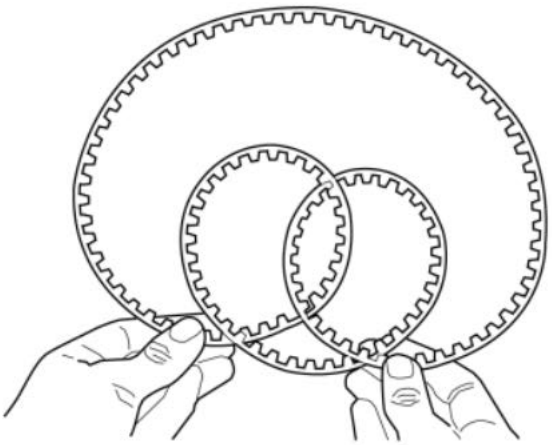
Required Tools

- 10 mm hex wrench
- 3 mm hex wrench
- Two 13mm wrenches
- 27 mm socket and socket wrench

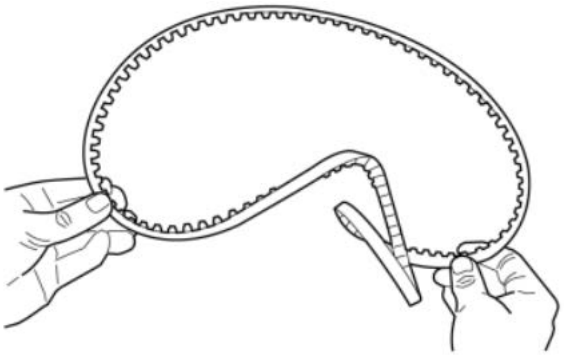
Uncoiling the Belt

⚠ CAUTION

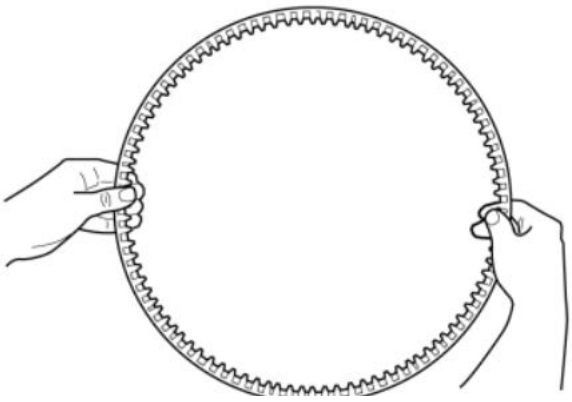
Improper uncoiling may cause permanent damage to the belt.



1. Hold the belt chest high in front of your body and hold the outer coil with both hands.



2. Move your hands away from each other slowly, until the belt uncoils on its own.



3. Now the belt is properly uncoiled.

Removal

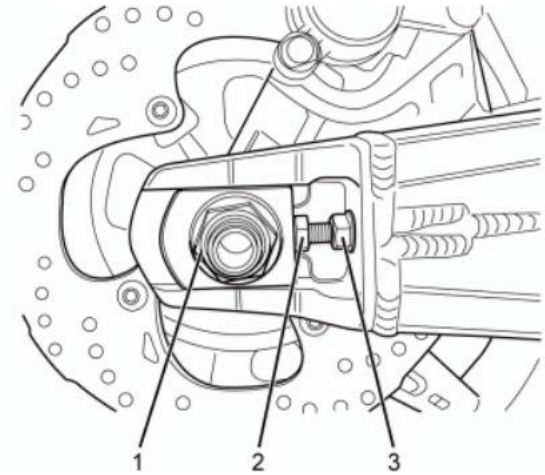
⚠ CAUTION

If reusing the belt, mark the direction on the belt so it can be installed in that direction.

1. Raise and safely support the motorcycle.

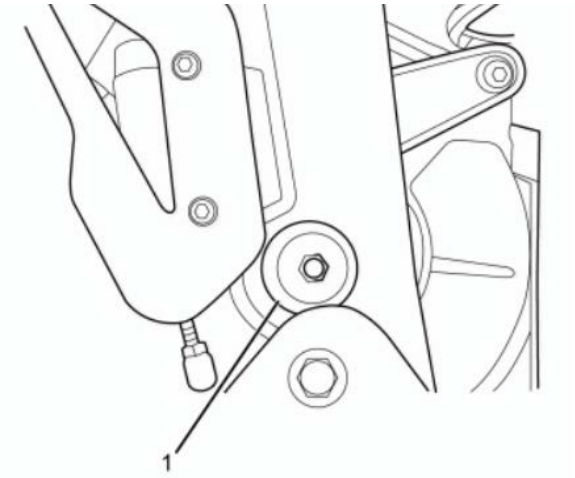
Note: The location of the swingarm ground strap and brake line clips, before removing the rear fender.

2. Remove the 4 bolts securing the rear fender to the swingarm, and remove the fender.



3. Loosen the rear axle nut (1).
4. Loosen the belt tensioner jam nut (3) and adjuster bolt (2). Right side shown, left side similar.
5. Slide the wheel forward and remove the belt from the sprocket.

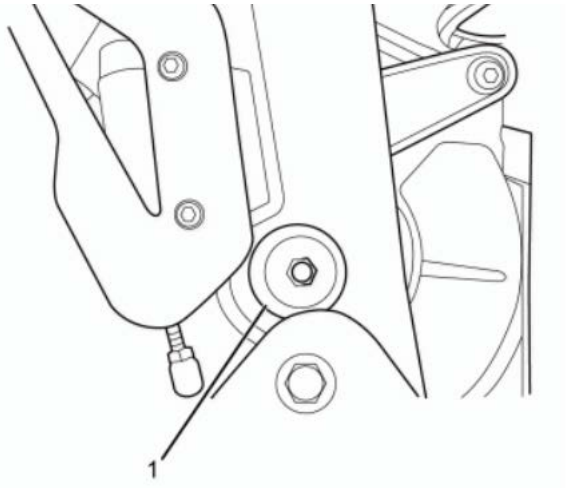
6. Remove the brake pedal pivot bolt.



7. Remove the protective rubber cap and pivot bolt (1). Right side shown, left side similar.
8. Pull the swingarm out enough to remove the belt from the motor pulley.

Installation

1. Inspect the sprockets for wear or damage, replace as needed.
2. Pull back on the swingarm enough to install on the motor pulley.



3. Install the swingarm pivot bolts (1) and tighten. Right side shown, left side similar.
   - Tighten swingarm pivot bolts to 75 lb-ft (102 Nm)
4. Install the protective rubber caps.
5. Install the brake pedal pivot bolt.
   - Tighten brake pedal pivot bolt to 34 lb-ft (46 Nm)
6. Install the belt on the wheel sprocket.
7. Adjust the belt tension. Refer to Belt Adjustment Procedure, page 10-5.
8. Install the fender, ground strap and brake line clips onto the swingarm.
9. Lower the motorcycle.

Motor Sprocket Replacement

Required Tools

- Propane torch
- Gear puller
- Loctite 271 and 680
- Approx. 18 in. (457 mm) section of old drive belt

Preparation



1. Make a “sprocket brake” out of an old section (approx. 18 in. (457 mm)) of belt as shown. This will be used to hold the sprocket stationary during removal and installation.

Removal

1. Remove the belt. Refer to Drive Belt Replacement, page 30-1.



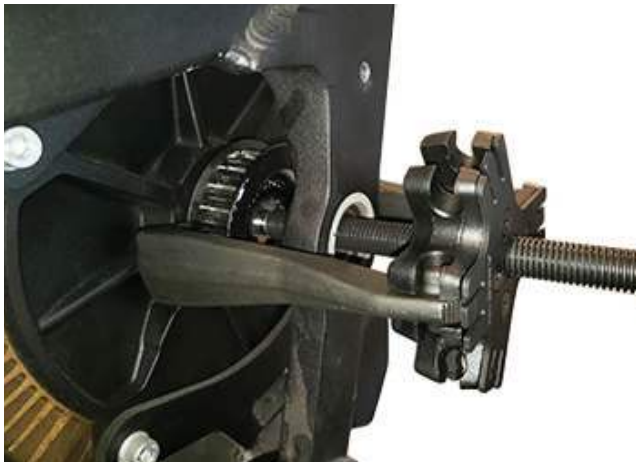
2. Heat the sprocket bolt for a minimum of 4 minutes (approx. 500° F {260 ° C}).



3. Carefully, install the belt tool using a punch to anchor the belt. Remove the sprocket screw using a hand ratchet. If the sprocket screw can not be easily removed with the ratchet, repeat the heating process.

⚠ CAUTION

Do not use an impact wrench or other power tool to remove the sprocket screw. Using an impact can cause permanent damage to the encoder and/or the target magnet resulting in unsafe operation.



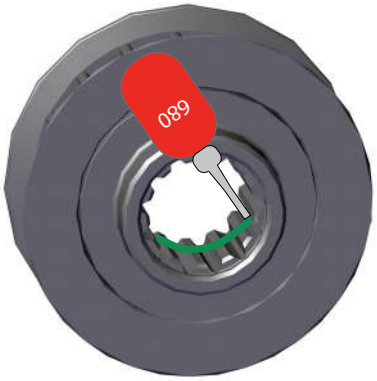
4. Use a jaw puller to remove the pulley. Slowly turn the puller to gently separate the pulley from the motor shaft.

⚠ CAUTION

Prying or hammering on the motor shaft can cause permanent damage to the encoder and or the target magnet resulting in unsafe operation.

Installation

1. Clean the motor shaft of any oil and/or grease. Use alcohol or brake cleaner with a wire brush and clean with a clean cloth.
2. Ensure that the shaft spacer is in place, if equipped.



Zero0068

3. Apply Loctite 680 onto the motor shaft splines and the splines of new sprocket. Install the sprocket onto the shaft.

⚠ CAUTION

Prying or hammering on the motor shaft can cause permanent damage to the encoder and or the target magnet resulting in unsafe operation.

4. Apply Loctite 271 onto the sprocket screw and install the top hat washer and the screw.
5. Use the section of belt that was fabricated to hold the sprocket stationary while tightening the screw.
   - Tighten to 53 lb-ft (72 Nm).
6. Install the belt. Refer to Drive Belt Replacement, page 30-1.

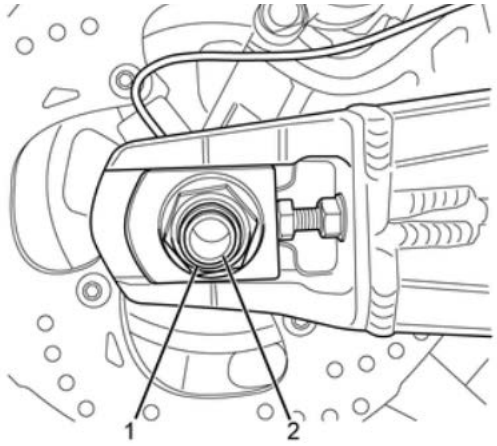
Rear Drive Sprocket

Required Tools

- 27mm socket and socket wrench
- 5 mm hex wrench

Removal

1. Securely raise and support the motorcycle so that the rear wheel is off the ground.



2. Remove the rear axle nut (1) and tap out the axle shaft. Note: Be aware of the axle shaft spacer on the left of the wheel.
3. Lower the wheel and remove the drive belt from the sprocket.

⚠ CAUTION

Support the brake caliper with mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

4. Move and support the brake caliper with mechanic's wire or equivalent. DO NOT disconnect the hydraulic brake hose from the brake caliper.



5. Remove the 4 Allen bolts (1) and nuts securing the sprocket to the wheel.
6. Remove the rear sprocket (2) from the wheel.

Installation

⚠ CAUTION

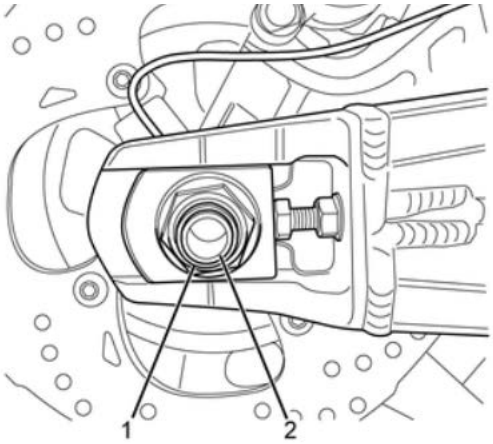
Whenever the sprocket has been separated from the wheel flange, any rust or contaminants must be cleaned from the wheel flange and the sprocket mating surfaces. Failure to do this may result in excessive assembled lateral runout (LRO) of the sprocket, which could lead to vibration.

1. Inspect the sprocket and wheel flange surface for rust or contamination. Remove rust or contamination if necessary.



2. Install the sprocket (2) onto the wheel flange.
3. Install the sprocket bolts (1) and nuts. Tighten in a crisscross pattern.
   - Tighten the rear sprocket bolts to 26 lb-ft (35 Nm)
4. Place the caliper into position on the swingarm.
5. Place the drive belt onto the wheel sprocket, ensuring that the left wheel spacer and the ABS sensor are in place.
6. Move the wheel into position. Ensure that the brake rotor is centered between the brake pads.

7. Verify belt tension. Refer to Belt Adjustment Procedure, page 10-5.



8. Slide the axle shaft (2) through the swingarm and wheel and install the nut (1).
   - Tighten the axle shaft nut to 75 lb-ft (102 Nm)

Motor Replacement

⚠ WARNING

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

⚠ CAUTION

Always ensure that the motor is timed using Zero motorcycle programming tools prior to operation.

Note: The motor serial number is stamped on the right hand side of the motor housing.

Required Tools

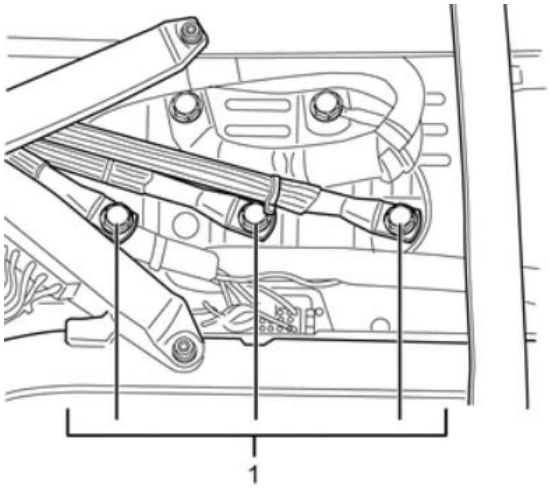
- 27 mm socket and socket wrench
- 4 mm hex wrench
- 5 mm hex wrench
- 6 mm hex wrench
- 22 mm wrench
- 13 mm wrench
- Philips screwdriver
- PN 85-05665 Controller Discharge Tool

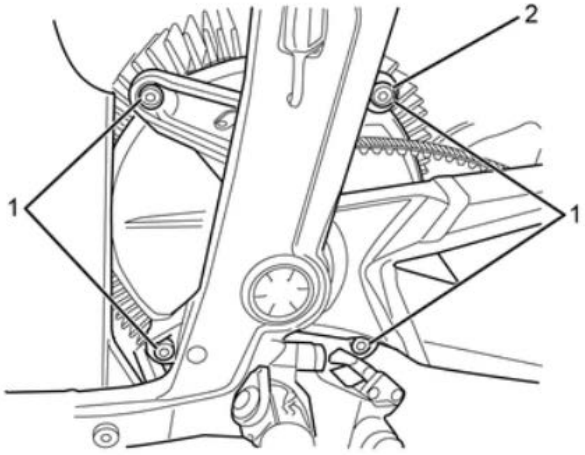
Removal

Note: Mark the location of all wires and cables prior to removal.

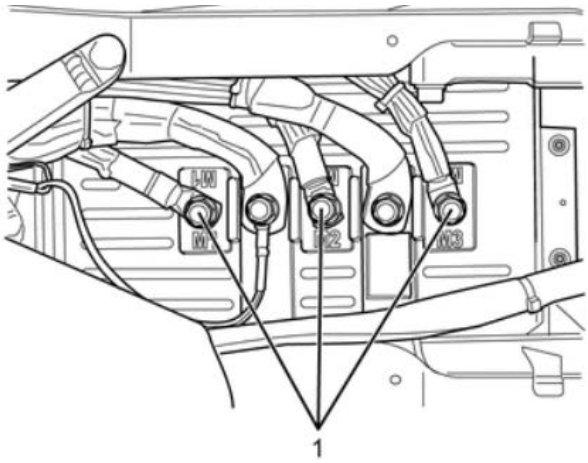
1. Discharge the high voltage system. Refer to High Voltage Discharging, page 10-1.
2. Remove the skid plate.
3. Disconnect the power pack charger connector C307 except 11kW or C307 11kW.
4. Remove the seat.
5. Remove the controller cover retaining screw and cover from the controller.

Size 4:



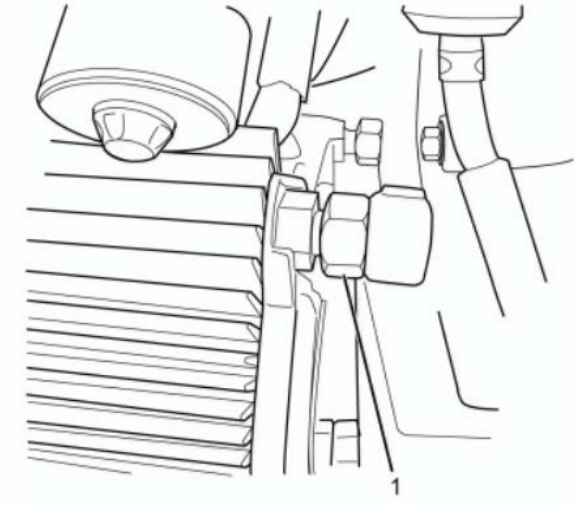


Size 6:



6. Remove the controller cable bolts (1).
7. Disconnect the motor harness connector C14 except 11kW or C14 11kW.
8. Remove the swingarm. Refer to Swingarm Assembly Replacement, page 40-17.

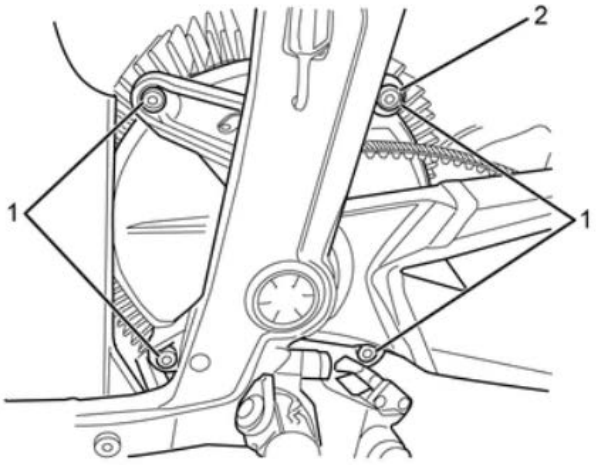
9. Loosen the 4 left side motor bolts (1). Loosen the right side motor bolts. Note the counter sunk head bolt (2) is a one-time use only.



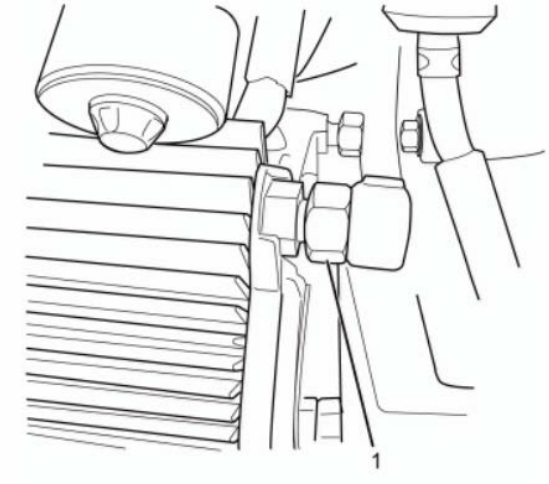
10. Loosen the right side motor spacer nut (1); do this for all 4 spacers.
11. Remove the motor bolts and lower the motor out the bottom of the motorcycle.

Installation

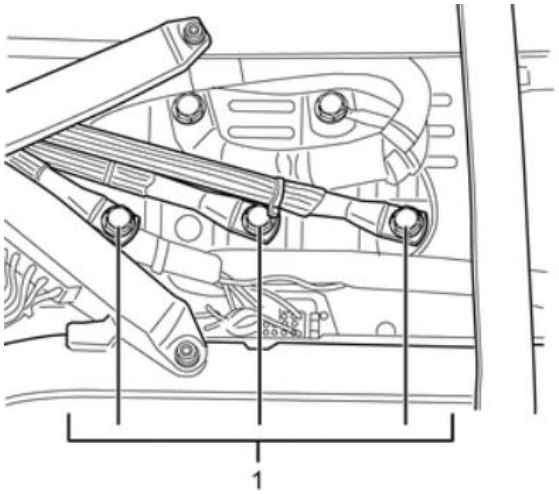
1. Install the drive belt onto the motor pulley.
2. Place the motor into the frame from the bottom, routing the cable up to the motor controller.



3. Install the 4 left side motor bolts (1) using a new bolt for position (2) and tighten.
   - Tighten to 20 lb-ft (27 Nm)



4. Install the 4 motor spacers and gently expand the nut (1) to take up the clearance between the motor and frame.
5. Install the 4 right side motor bolts and tighten.
   - Tighten right side motor bolts to 20 lb-ft (27 Nm)
6. Apply polylube 1000 on the threads and install the 4 left side motor bolts and tighten.
   - Tighten left side motor bolts to 20 lb-ft (27 Nm)
7. Install the swingarm. Refer to Swingarm Assembly Replacement, page 40-17.
8. Connect the power pack charger connector C307.
9. Install the skid plate.
   - Tighten skid plate bolts to 7 lb-ft (9 Nm)



10. Install the motor cables (1) onto the motor controller.
    - Tighten motor controller cable bolts to 9 lb-ft (12 Nm)
11. Connect C14 motor harness connector.
12. Install the controller cover and retaining screw retaining screw.
13. Install the seat.
14. Adjust the belt tension. Refer to Belt Adjustment Procedure, page 10-5.
15. If a new motor was installed, manually enter the offset angle listed on the sticker of the new motor before proceeding to the next step.
16. Commission the new motor. Refer to Motor Commissioning, page 30-18.

Motor Controller Replacement

⚠ WARNING

Always perform the High Voltage Disabling procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

⚠ CAUTION

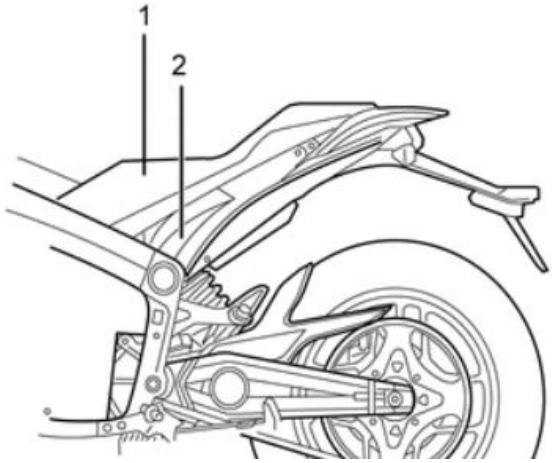
Always ensure that the controller is commissioned using Zero motorcycle programming tools prior to operation.

Required Tools

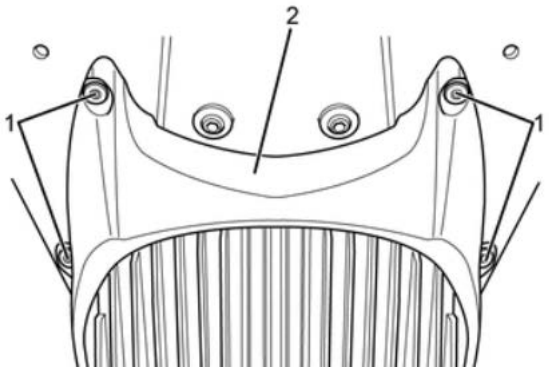
- 8 mm wrench
- 13 mm wrench
- 3 mm hex wrench
- 6 mm hex wrench
- 5 mm hex wrench
- Philips screwdriver
- PN 85-05665 Controller Discharge Tool

Removal

1. Discharge the high voltage system. Refer to High Voltage Discharging, page 10-1.



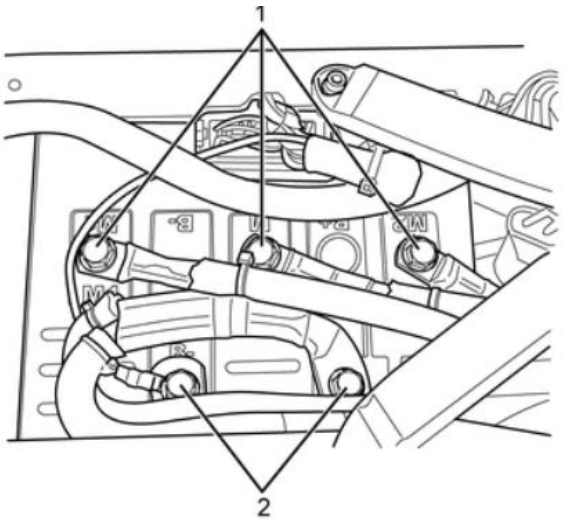
2. Remove the seat (1).
3. Remove the rear shock.
4. Remove the left side trim screw (2) and the right side trim screw.



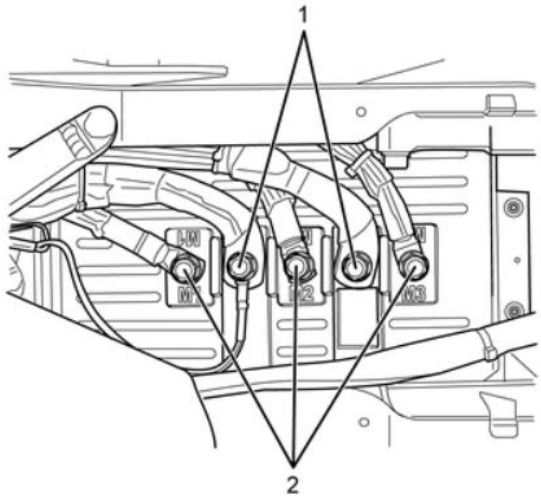
5. Remove the 4 body fasteners (1) and remove the rubber trim (2).
6. Disconnect the C90 11 kW or C90 except 11 kW controller connector.
7. Remove the controller cover retaining screw and cover from the controller.

Note: Mark the cable location and orientation prior to removal.

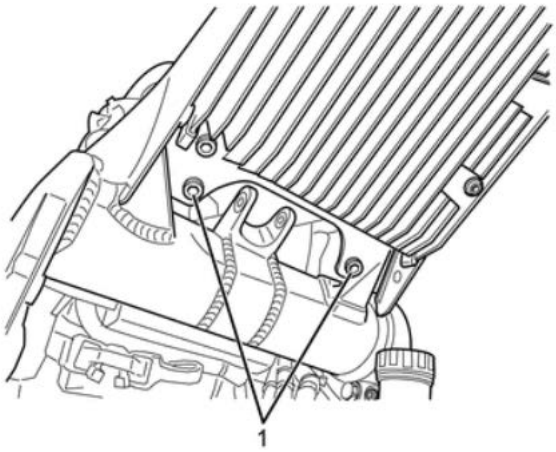
Size 4:



Size 6:

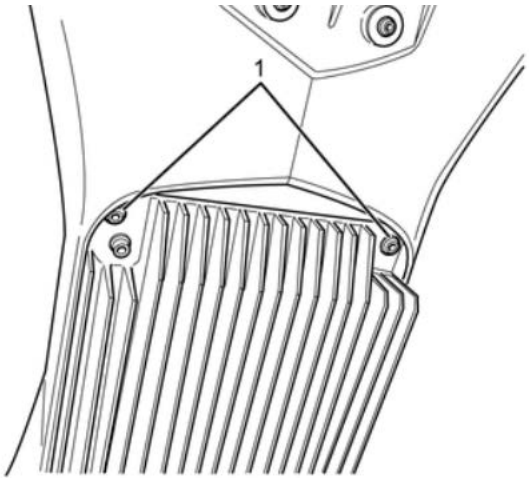


8. Remove the motor cable bolts (1) from the motor controller.
9. Remove the power pack cables (2) from the motor controller.

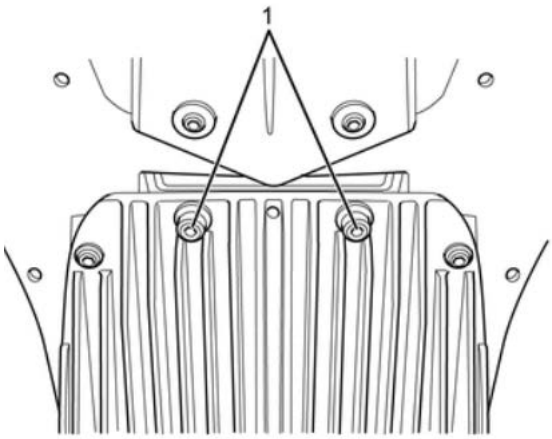


10. Remove the front controller bolts (1).

Size 4:



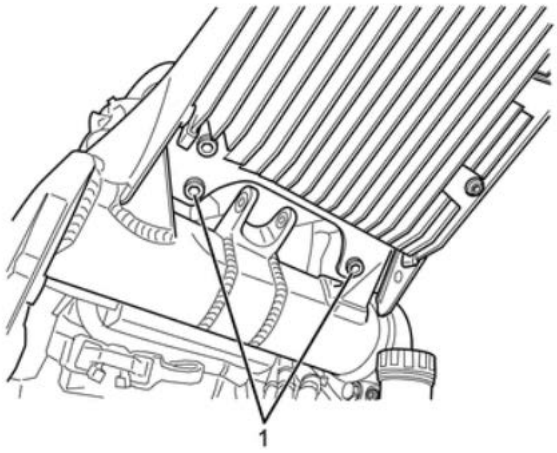
Size 6:



11. Remove the rear controller bolts (1) spacers (size 4 only) and remove the controller.
12. Remove the heat sink from the controller if required. Refer to Motor Controller Heat Sink Replacement, page 30-12.

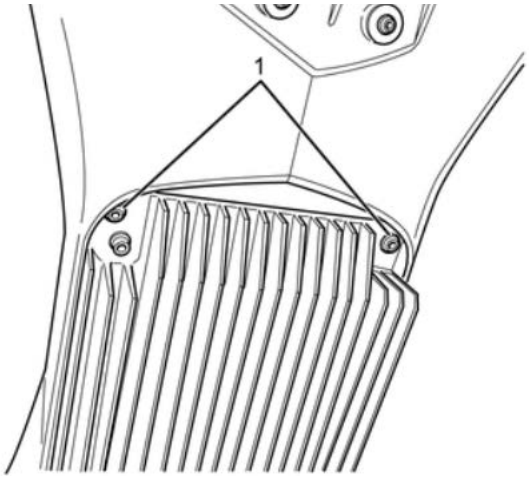
Installation

1. Install the heat sink onto the controller if required. Refer to Motor Controller Heat Sink Replacement, page 30-12.
2. Place the controller into position and loosely install the front bolts (1).

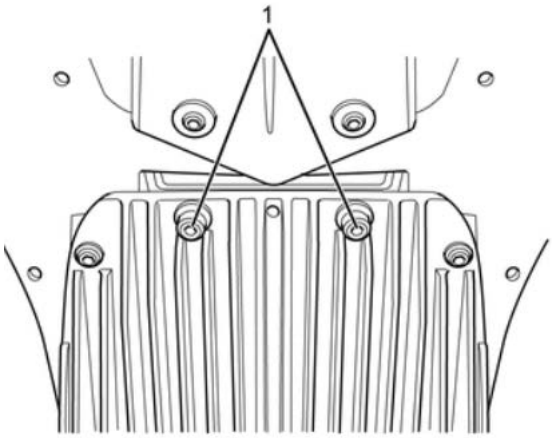


3. Loosely install the rear controller bolts (1).

Size 4:

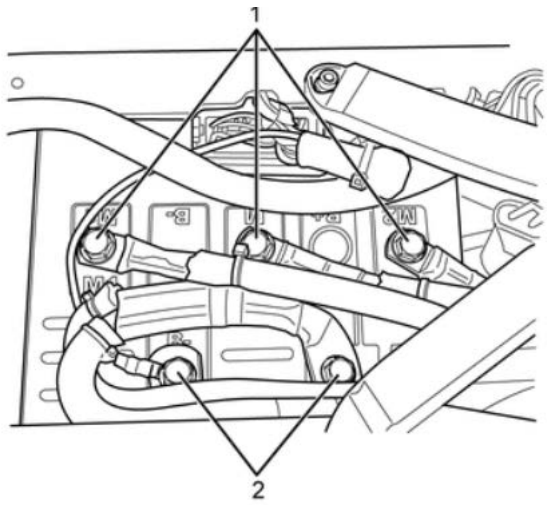


Size 6:

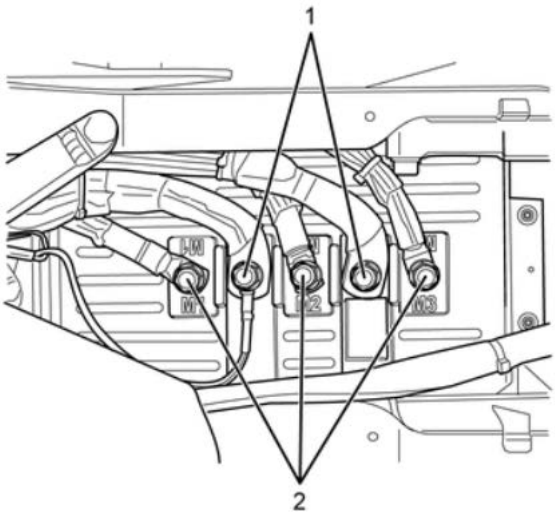


4. Tighten all four controller bolts.
   - Tighten to 19 lb-ft (26 Nm)

Size 4:

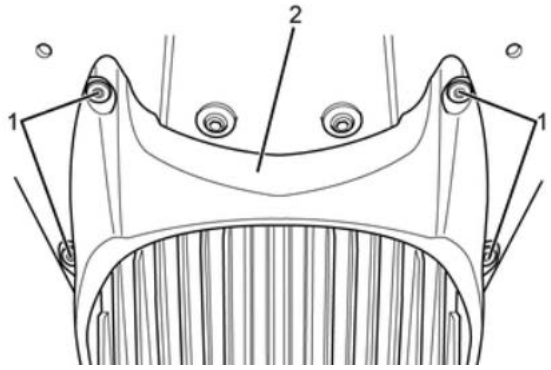


Size 6:

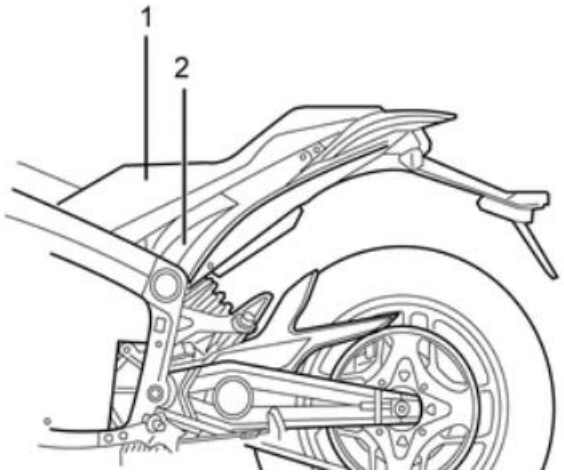


5. Install the cables (1, 2) to the controller in the same locations as removed and tighten.
   - Tighten cable bolts to 9 lb-ft (12 Nm)
6. Install the controller cover and cover retaining screw.
7. Install the rear shock.

8. Connect the C90 controller connector.



9. Install the rubber trim (2) and body fasteners (1).



10. Install the left side trim nut and bolt (2), and the right side trim nut and bolt.
11. Install the seat (1).
12. Commission the new controller. Refer to Motor Commissioning, page 30-18.

Motor Controller Heat Sink Replacement

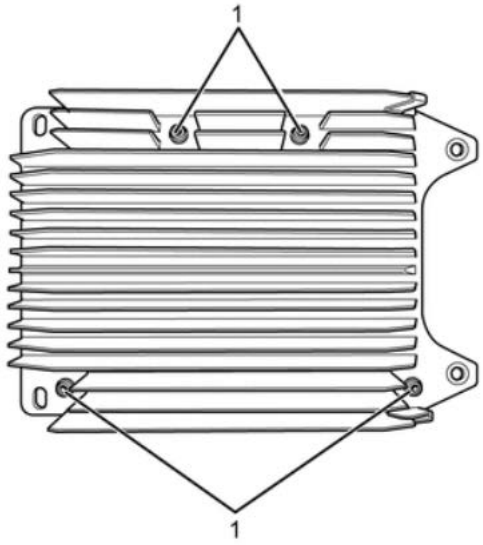
Note: Size 4 shown, size 6 similar.

Required Tools

- 10 mm hex wrench
- 13 mm hex wrench
- 4 mm hex wrench
- 6 mm hex wrench
- 8 mm hex wrench

Removal

1. Remove the motor controller. Refer to Motor Controller Replacement, page 30-9.



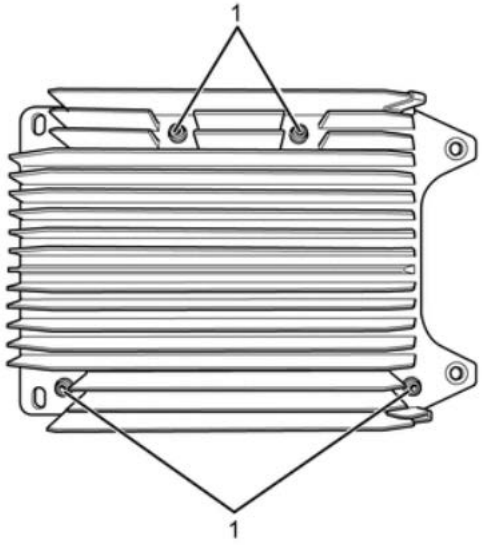
2. Remove the heat sink bolts (1), and separate the heat sink from the motor controller.

Installation

⚠ CAUTION

A layer of thermal grease (such as Dow Corning® 340) MUST be applied as described below, before bolting the motor controller to the heat sink.

1. Clean the mounting surface of the motor controller of any old thermo grease.
2. Apply the thermal grease to both the motor controller and the heat sink using a small soft paint roller to ensure an even spread of thermal compound. The most appropriate thickness will look white but with a grayish color still showing through from the controller base or heat sink. Note that too little thermal compound will not fill all gaps of the contact surfaces, but too much thermal compound may prevent the gap from closing up when tightening.
3. Place the heat sink onto the motor controller and rub both surfaces together. This will help transfer the thermal compound between the two surfaces.



4. Install the heat sink bolts (1).
   - Size 4: Tighten to 5 lb-ft (7 Nm)
   - Size 6: Tighten to 8 lb-ft (11 Nm)
5. Install the motor controller. Refer to Motor Controller Replacement, page 30-9.

Main Bike Board (MBB) Replacement

⚠ CAUTION

Caution: Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

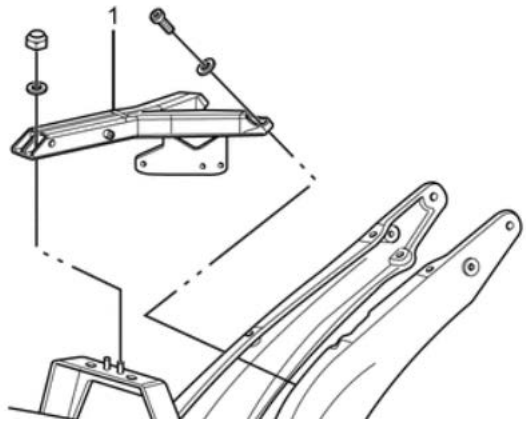
Required Tools

- 3 mm hex wrench
- 4 mm hex wrench
- 5 mm hex wrench
- PN 85-05665 Controller Discharge Tool
- 10 mm wrench
- Philips screwdriver

Removal

Note: Mark the location and routing of all wires and cables prior to removal.

1. Discharge the high voltage system. Refer to High Voltage Discharging, page 10-1.
2. Remove the seat.
3. Remove the front fender.
4. Remove the tank assembly.



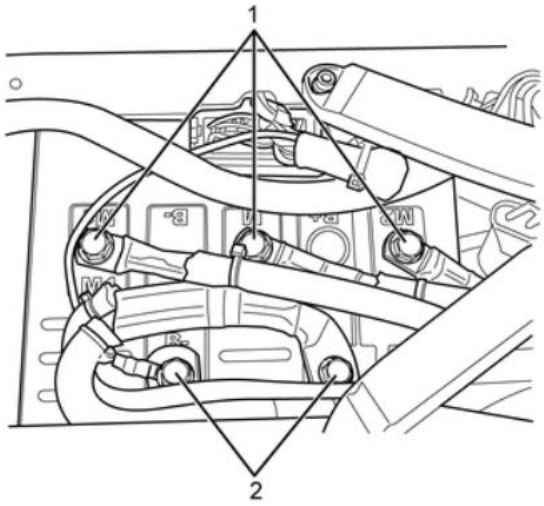
5. Remove the upper frame/fuse center bracket (1), and set aside.

Note: Leave the wiring connected to the fuse center.

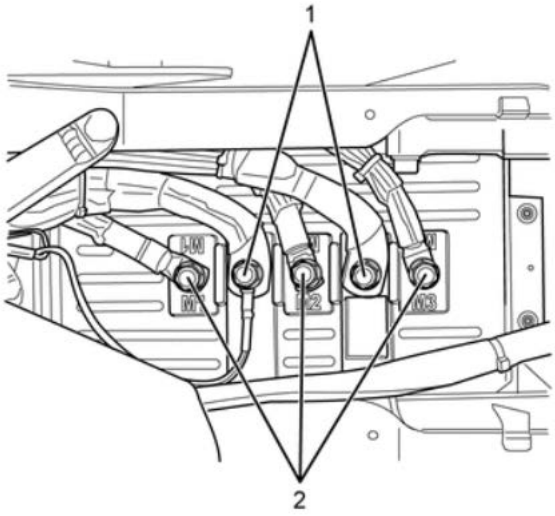
6. Disconnect the C1 11 kW or C1 except 11 kW and C2 11 kW or C2 except 11 kW MBB harness connectors.

7. Remove the motor controller cover retaining screws and cover. Mark the location of motor controller cable bolts prior to removal.
8. Remove the controller cable bolts (1,2) and remove the cables.

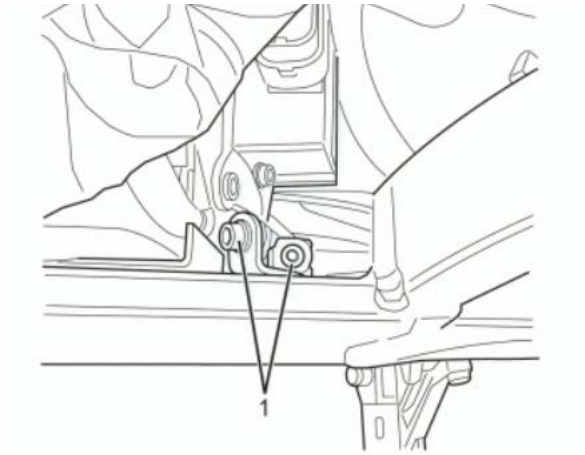
Size 4:



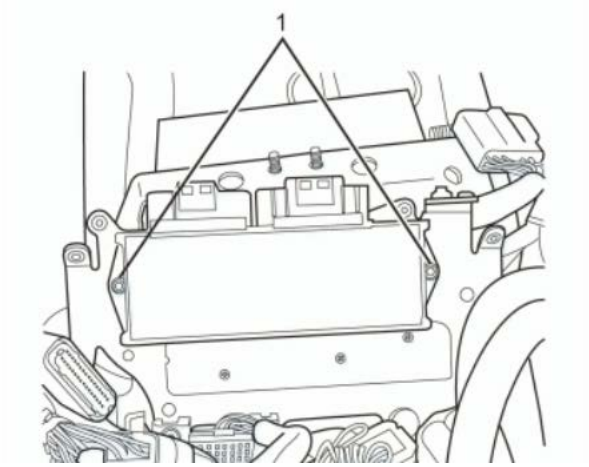
Size 6:



9. Remove the rear ABS harness mounting bracket from the bottom of the module bracket.
10. Remove the screws securing the C3 11 kW or C3 except 11 kW data link connector from the bottom of the module bracket.
11. Remove the screws securing the C50 11 kW or C50 except 11 kW quick charge connector from the bottom of the module bracket.
12. Disconnect the C14 11 kW or C14 except 11 kW Motor Harness to the Chassis Harness connector.

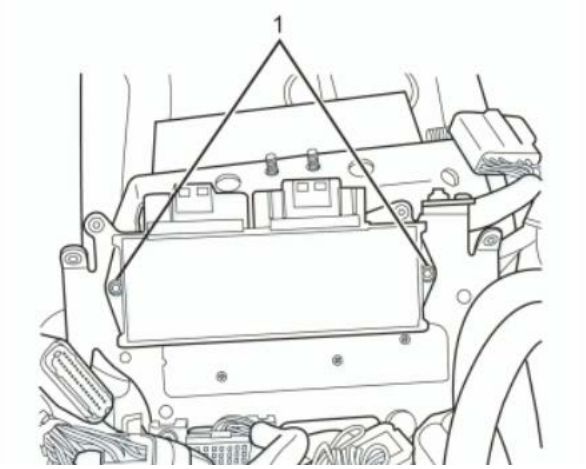


13. Remove the 2 left side module bracket bolts (1) and the right side module bracket bolts.
14. Carefully moving harnesses out of the way, pull the module bracket up enough to disconnect the C8 11 kW or C8 except 11 kW DC/DC converter harness connector and access the MBB bolts.



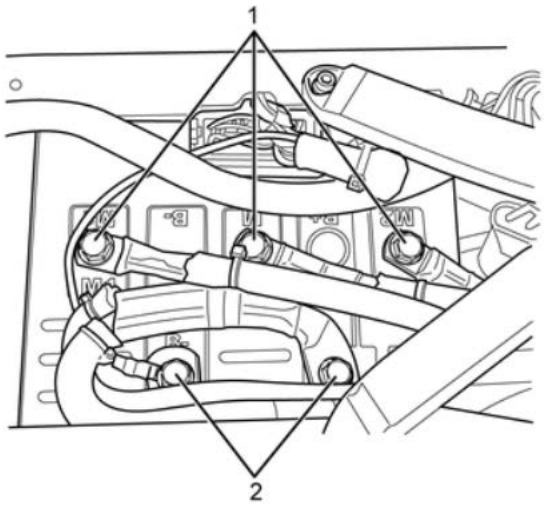
15. Remove the 2 bolts (1) securing the MBB to the module bracket and remove the MBB.

Installation

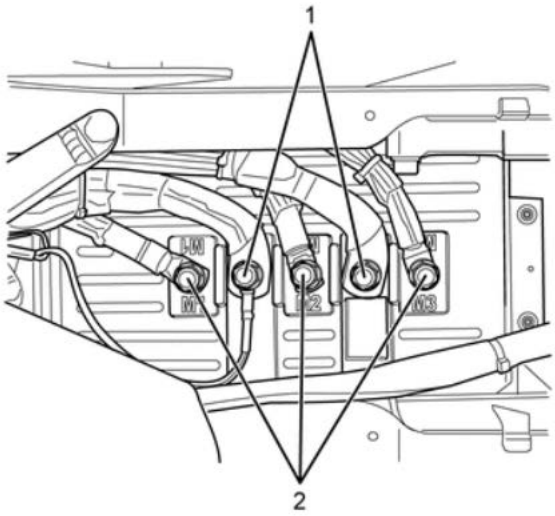


1. Install the MBB onto the module bracket and install the bolts (1).
   - Tighten MBB bolts to 12 lb in (1.4 Nm)
2. Slide the module bracket into position and connect the C08 DC/DC converter harness connector.
3. Install the 2 left side module bracket bolts (1) and the right side module bracket bolts.
   - Tighten module bracket bolts to 5 lb-ft (7 Nm)
4. Install the screws securing the C50 quick charge connector onto the bottom of the module bracket.
5. Install the screws securing the C3 data link connector onto the bottom of the module bracket.
6. Install the rear ABS harness mounting bracket onto the bottom of the module bracket.
7. Connect the C14 Motor Harness to the Chassis Harness connector.
8. Install the cables and bolts (1,2) in the same locations and routings as removed.
   - Tighten motor controller cable bolts to 9 lb-ft (12 Nm)

Size 4:



Size 6:



9. Install the controller cover and cover retaining screws.
10. Connect the C90 motor controller connector.
11. Connect the C01 and C02 MBB harness connectors.
12. Install the upper frame/fuse center bracket (1), and tighten the nuts.
    - Tighten upper frame/fuse center bracket nuts to 7 lb-ft (9 Nm)
13. Install the tank assembly.
14. Install the front fender.
15. Install the seat.

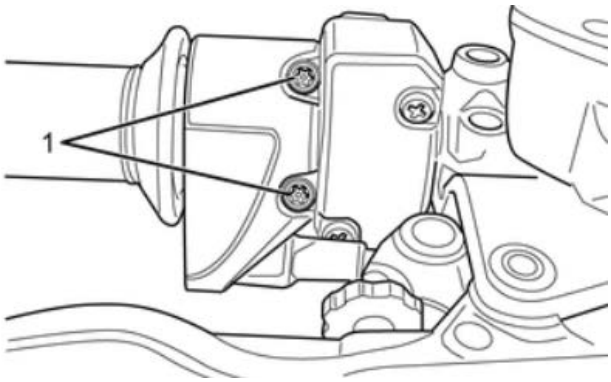
Throttle Replacement

Required Tools

- T20 tamper proof star wrench
- 5 mm hex wrench
- 3 mm hex wrench

Removal

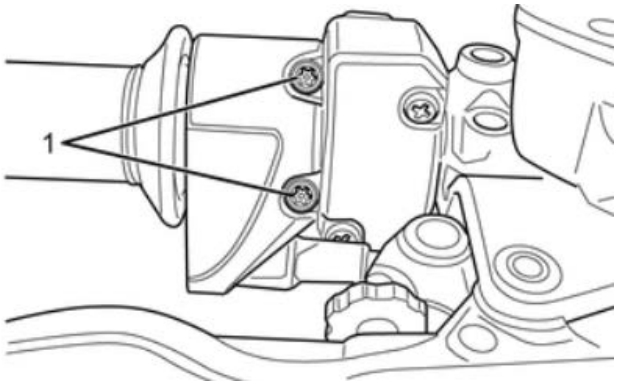
1. Remove the instrument panel and turn signal assembly. Note the harness routing and location of the zip ties for reassembly.
2. Remove and discard the zip ties.
3. Disconnect the throttle harness connector C459.



4. Loosen the two throttle screws (1) and slide the throttle off of the handlebar.

Installation

1. Slide the throttle onto the handlebar.



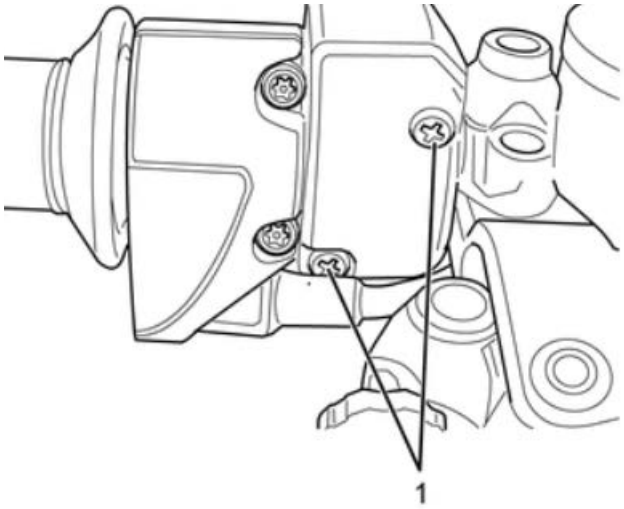
2. Securely tighten the two screws (1). Do not over tighten.
3. Twist the throttle and verify that the throttle is smooth and returns correctly.
4. Connect the throttle harness connector C459.
5. Install new zip ties in the same location as removed.
6. Install the instrument panel and turn signal assembly.

Note: Ensure that ground C239 is attached.

Motor Stop Switch Replacement

Removal

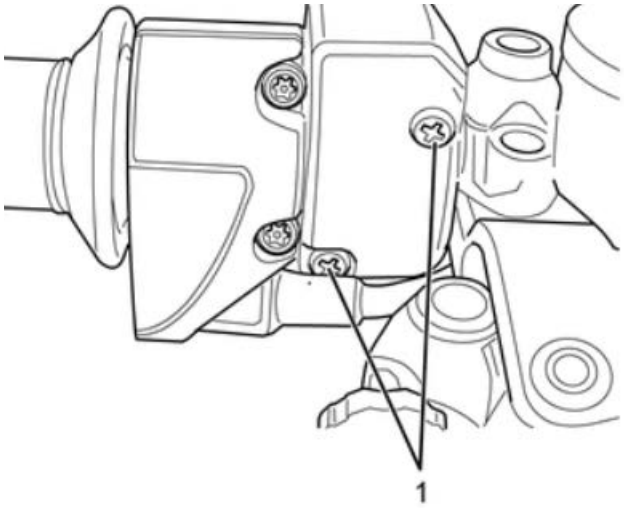
1. Remove the headlight assembly.
2. Disconnect the C275 motor stop switch harness connector. Note the location of the zip ties for reassembly.
3. Remove and discard the zip ties.



4. Remove the two screws (1) and remove the motor stop switch from the handlebar.

Installation

1. Install the motor stop switch onto the hole in the handlebar.



2. Install the two screws (1).
   - Tighten motor stop switch screws to 24 lb in. (3 Nm)
3. Install new zip ties in the same location as removed.
4. Connect the C275 motor stop switch harness connector.
5. Install the headlight assembly.

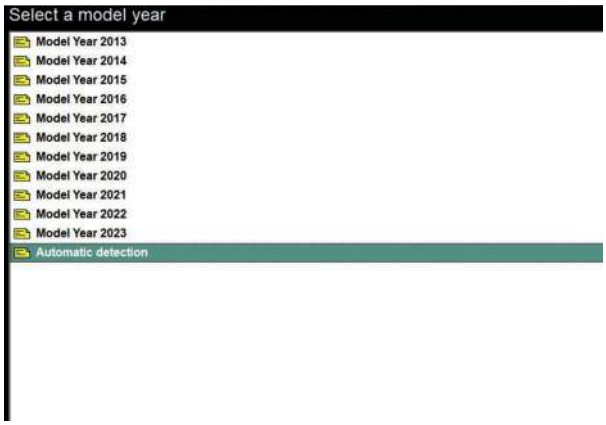
Motor Commissioning

Perform this procedure after replacing the motor or controller.

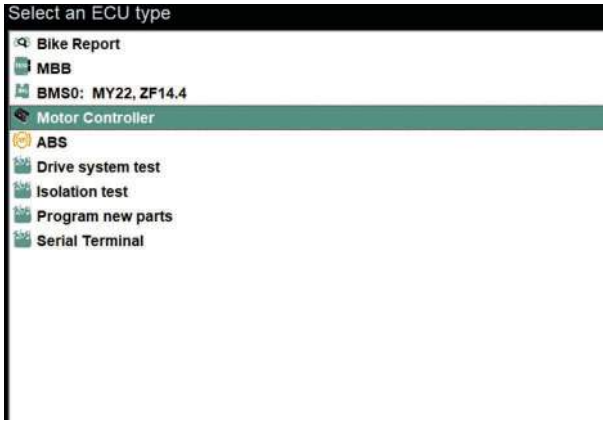
1. Connect the motorcycle to Diag4Zero and turn the key on.
2. Double click the Diag4 icon.



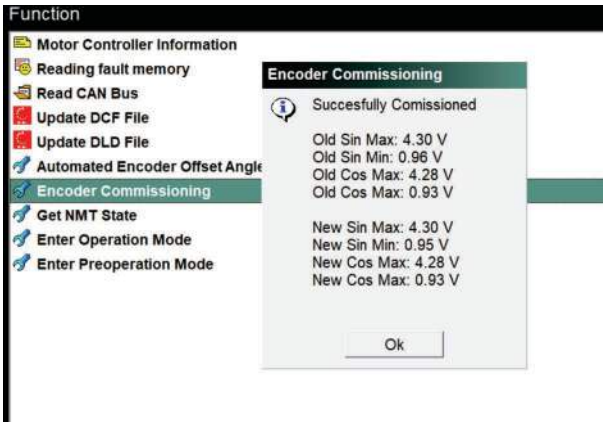
3. Select “Troubleshooting”.



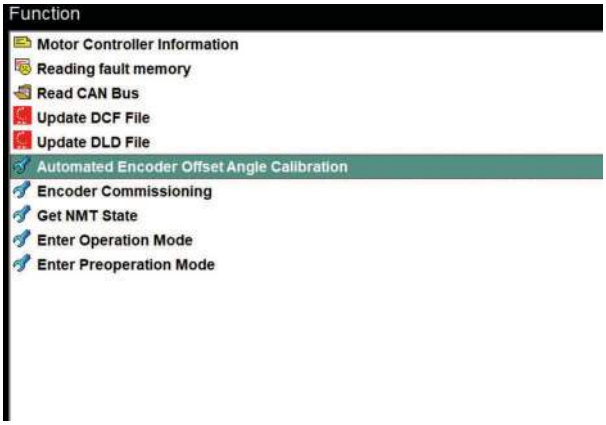
4. Select the model year or select “Automatic detection”.



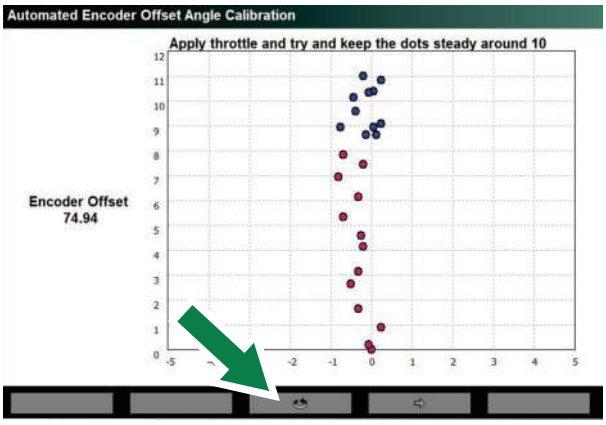
5. Select “Motor Controller”.



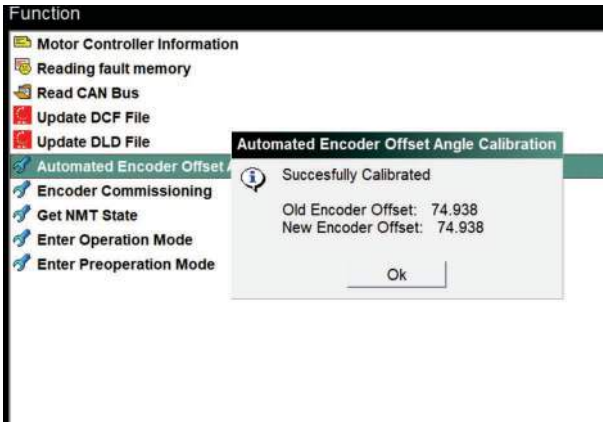
6. Select Encoder Commissioning. Once complete, select Ok.



7. Select “Automatic Encoder Offset Angle Calibration”.



8. Press the circular arrow button and enter the offset value from the motor. Then, follow the prompts for the dots.
9. Press the blue arrow to input motor offset.
10. After entering the offset, press the green arrow and then follow the prompt on top of the graph.



11. Once complete, select “Ok” and exit the program.

Front Fork Specifications

ZF7.2

Model	S		DS	
Component	Fork		Fork	
Side	Left	Right	Left	Right
Free Length	721±2.0mm		769.4±2.0 mm	
Max Length	727 mm		778 mm	
Min Length	568 mm		600 mm	
Stroke	159 mm		178 mm	
Spring Rate	7.4 N/mm* *		6.0-7.0 N/mm	
Oil	SS No.8		SS No.8	
Oil Volume	371±2.5 cm^3		408±2.5 cm^3	
Oil Level	178 mm*		170 mm	
Rebound (Tension)	Max - 9 clicks		Max - 12 clicks	
Compression	Max - 8 clicks		Max - 7 clicks	
Preload	Min + 7.5 turns		Min + 5.5 turns	
Outer Tube Finish	Natural Anodized (silver)		Natural Anodized (silver)	
Slide Tube Finish	Nickel - Hard Chrome		Nickel - Hard Chrome	
Rebound (Tension) Finish	Red Anodized		Blue Anodized	
Compression Finish	Red Anodized		Blue Anodized	

* Measured from outer tube end to oil surface (condition: spring, spring joint, spring collar, seat rubber, slider, fork bolt are removed and dust seal touches axle holder)

* * Dual Rate

ZF14.4

Model	S		SR		DS		DSR	
Component	Fork		Fork		Fork		Fork	
Side	Left	Right	Left	Right	Left	Right	Left	Right
Free Length	721±2.0 mm		721±2.0 mm		769.4±2.0 mm		769.4±2.0 mm	
Max Length	727 mm		727 mm		778 mm		778 mm	
Min Length	568 mm		568 mm		600 mm		600 mm	
Stroke	159 mm		159 mm		178 mm		178 mm	
Spring Rate	7.4 N/mm* *		7.4 N/mm		6.0-7.0 N/mm		6.0-7.0 N/mm	
Oil	SS No.8		SS No.8		SS No.8		SS No.8	
Oil Volume	443±2.5 cm^3		443±2.5 cm^3		408±2.5 cm^3		408±2.5 cm^3	
Oil Level	112 mm*		112 mm		170 mm		170 mm	
Rebound (Tension)	Max - 9 clicks		Max - 9 clicks		Max - 11 clicks		Max - 11 clicks	
Compression	Max - 6 clicks		Max - 6 clicks		Max - 6 clicks		Max - 6 clicks	
Preload	Min + 7.5 turns		Min + 7.5 turns		Min + 7.5 turns		Min + 7.5 turns	
Outer Tube Finish	Natural Anodized (silver)		Natural Anodized (silver)		Natural Anodized (silver)		Natural Anodized (silver)	
Slide Tube Finish	Nickel - Hard Chrome		Nickel - Hard Chrome		Nickel - Hard Chrome		Nickel - Hard Chrome	
Rebound (Tension) Finish	Red Anodized		Red Anodized		Blue Anodized		Blue Anodized	
Compression Finish	Red Anodized		Red Anodized		Blue Anodized		Blue Anodized	

*Measured from outer tube end to oil surface (condition: spring, spring joint, spring collar, seat rubber, slider, fork bolt are removed and dust seal touches axle holder)

* *Dual Rate

Rear Suspension Specifications

ZF7.2

Factory Supplied Rear Shock Settings

Model	S	DS
Component	Shock	Shock
Free Length	278.5 ± 2.0 mm	284.5 ± 2.0 mm
Max Length	279 mm	285 mm
Min Length	219 mm	219 mm
Stroke	60 mm	66 mm
Spring Rate	98.1 N/mm	96.1 N/mm
Rebound (Tension)	Max - 8 clicks	Max - 12 clicks
Compression	Max - 14 clicks	Max - 10 clicks
Preload	5th Position	5th Position
Body Finish	Natural Anodized (silver)	Natural Anodized (silver)
Rod Finish	Nickel - Hard Chrome	Nickel - Hard Chrome
Rebound (Tension) Finish	Red Anodized	Blue Anodized
Compression Finish	Red Anodized	Blue Anodized

ZF14.4

Model	S	SR	S	DS
Component	Shock	Shock	Shock	Shock
Free Length	278.5 ± 2.0 mm	278.5 ± 2.0 mm	284.5 ± 2.0 mm	284.5 ± 2.0 mm
Max Length	279 mm	279 mm	285 mm	285 mm
Min Length	219 mm	219 mm	219 mm	219 mm
Stroke	60 mm	60 mm	66 mm	66 mm
Spring Rate	98.1 N/mm	98.1 N/mm	96.1 N/mm	96.1 N/mm
Rebound (Tension)	Max - 6 clicks	Max - 6 clicks	Max - 9 clicks	Max - 9 clicks
Compression	Max - 12 clicks	Max - 12 clicks	Max - 13 clicks	Max - 13 clicks
Preload	5th Position	5th Position	5th Position	5th Position
Body Finish	Natural Anodized (silver)	Natural Anodized (silver)	Natural Anodized (silver)	Natural Anodized (silver)
Rod Finish	Nickel - Hard Chrome	Nickel - Hard Chrome	Nickel - Hard Chrome	Nickel - Hard Chrome
Rebound (Tension) Finish	Red Anodized	Red Anodized	Blue Anodized	Blue Anodized
Compression Finish	Red Anodized	Red Anodized	Blue Anodized	Blue Anodized

Preferred Rear Sag Settings

Model	SAG
S and SR	45 mm (1.77 in)
DS and DSR	59 mm (2.32 in)

Suspension General Diagnosis

Preliminary Checks

Since problems in steering, suspension, tires, and wheels involve several systems, all systems must be considered when diagnosing a complaint. In order to avoid pursuing the wrong symptom, always test ride the vehicle first. Refer to Road Testing Procedure, page 1-20. Proceed with the following preliminary checks and correct any substandard conditions which are found.

- Inspect the tires for the following:
  - Pressure
  - Wear
  - Size
  - Brand
  - Construction
  - Balance
  - Runout
- Inspect the wheels for the following:
  - Size
  - Balance
  - Runout
  - Damage
  - Proper installation
- Inspect the following for loose connections, wear, or damage:
  - The steering fork
  - The front suspension
  - The rear suspension

General Diagnostics

Compression Damping

Compression controls the initial "bump travel" of the suspension. As the wheel is forced upward by the bump, the compression circuit controls the speed at which the suspension compresses, helping to keep the spring from allowing an excessive amount of travel or bottoming of the suspension.

Damping is viscous friction caused by forcing a fluid through some type of restriction. Damping force is determined by the speed of the fluid movement, not the distance of suspension travel.

Rebound Damping

Controls the extension of the fork or shock after it compresses over a bump.

Ride Height

Raising or lowering the fork or lengthening or shortening the shock to change the chassis height of the motorcycle.

Spring Rate

Force needed compress the spring a given distance.

Fork

Adjustment	Setting	Effect
Compression Damping	Too much	• Bike difficult to turn in and will steer wide through the turn • Front wheel skips on bumps • Forks judder when braking in a straight • Front end feels harsh on small bumps
	Not enough	• Forks dive too quickly, possibly bottoming out • Rear end wants to come around during hard braking • Front end has a mushy and semi-vague feeling, similar to lack of rebound damping
Compression Damping	Too much	• Front end chatters coming out of corners • Forks pack down on fast bumpy pavement • Front end wiggles or tank-slaps on hard acceleration out of bumpy corners • Harsh ride due to forks packing down
	Not enough	• Excessive pogo action through chicanes • Front end shakes (not chatters) in corners • Front end shoots up too fast after braking • Feels plush when riding straight, but mushy in corners and traction feel is poor • When flicking into a corner at speed, the bike will porpoise or wallow a bit before settling down
Ride Height	Too low	• Lack of high speed stability • Easy turn-in into corners
	Too high	• Sluggish or high effort turn-in into corners
Spring Rate	Too soft	• Forks compress too much on smooth turns • Forks bottom out during hard braking or large bumps • Creates oversteer • Can cause front to tuck under • Turns easily into corners
	Too stiff	• Forks compress too much on smooth turns • Forks bottom out during hard braking or large bumps • Creates oversteer • Can cause front to tuck under • Turns easily into corners

Rear Shock

Adjustment	Setting	Effect
Compression Damping	Too much	• Shock rigid and harsh, but not as bad as too much rebound damping • Rear wheel skips when braking on rippled pavement • Very little rear end squat on acceleration
	Not enough	• Shock bottoms out on medium sized bumps • Rear end squats on acceleration • Possible bottoming of shock • Bike steers wide exiting corners (rear-low, nose-high)
Rebound Damping	Too much	• Rear wheel hops on turns with small bumps, especially washboard • Rear wheel skips when braking on rippled pavement • Rear end packs down over series of bumps • Rear feels harsh • Bike steers wide exiting corners (rear-low, nose-high)
	Not enough	• Rear wheel hops on turns with small bumps, especially washboard • Rear wheel skips when braking on rippled pavement • Rear end packs down over series of bumps • Rear feels harsh • Bike steers wide exiting corners (rear-low, nose-high)
Ride Height	Too low	• Motorcycle understeers on exit corners • Difficult to change direction • Poor grip from front tire on exit corners
	Too high	• Lack of high speed stability • Poor grip from rear tire • Unstable under heavy braking
Spring Rate	Too soft	• Lack of high speed stability • Poor grip from rear tire • Unstable under heavy braking
	Too stiff	• Easy turn-in to corners • Ride is harsh • Poor rear wheel traction

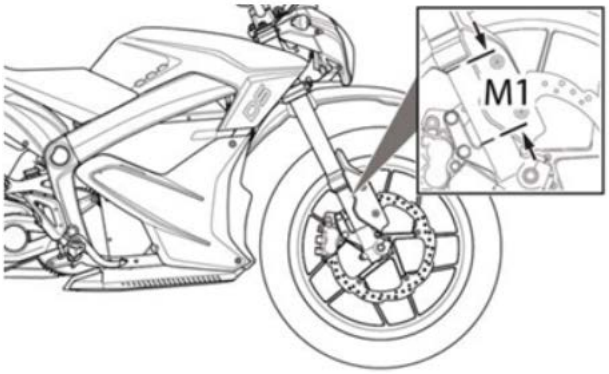
Front Suspension Adjustment

⚠ CAUTION

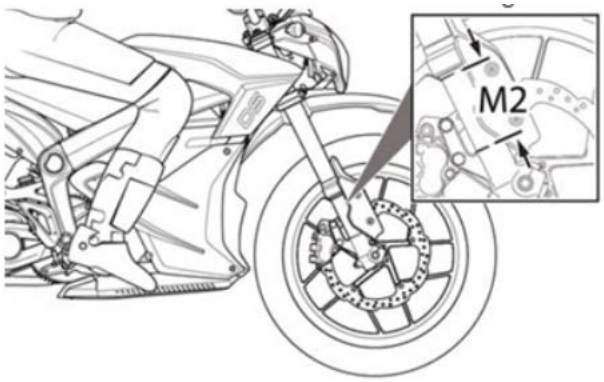
Adjusters should never be forced completely in one direction; always leave one click of adjustment in either direction.

Fork Preload (sag)

1. Support the motorcycle upright on a stand with the front wheel on the ground.
2. Measure vertically from the bottom of the fork tube to the bottom of the tube's dust seal.

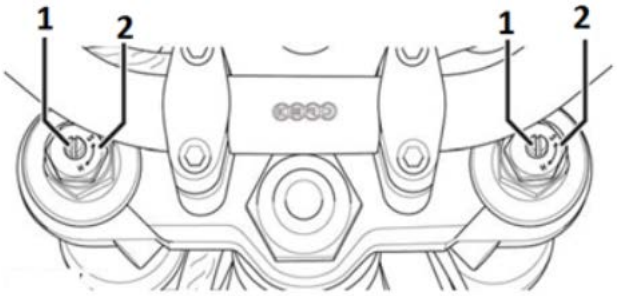


3. Record this measurement (this is the measurement referred to as M1).
4. Remove the motorcycle from the stand.
5. Wearing your normal riding apparel, sit on the motorcycle.
6. Have an assistant hold the motorcycle upright, your feet should be on both pegs.
7. Bounce the suspension a couple of times.
8. Have a second assistant take a measurement using the same locations as previously used.



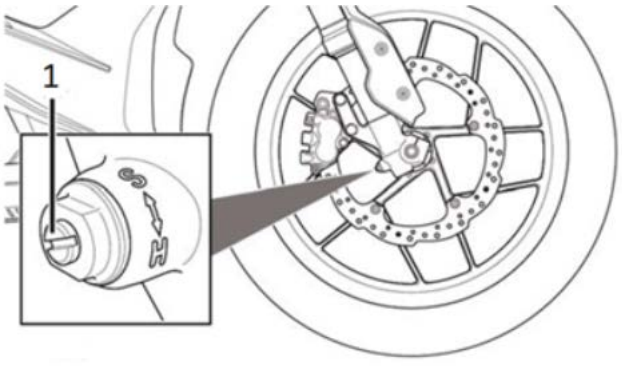
9. Record this measurement (this is the measurement referred to as M2).
10. Subtract the second measurement (M2) from the first measurement (M1).

Rebound Damping



The rebound damping is adjusted by turning the slotted brass adjuster screw (1) on the top of both fork legs. Next to it will be the writing S-F, meaning Slow and Fast. The adjuster has 9 stages of adjustment. This determines how quickly the fork returns to its extended position after being compressed. Turning the rebound adjuster screw clockwise will slow the rebound speed down making it better for larger, rolling terrain or bumps. Turning the rebound adjuster screw counter-clockwise will increase the rebound speed making it better for smaller, rougher bumps. Adjust each fork leg evenly.

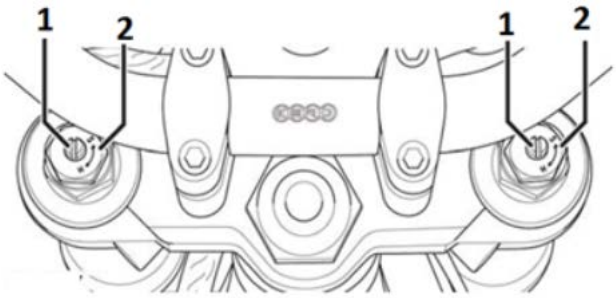
Compression Damping



The compression damping is adjusted by turning a screw (1) on the bottom of each fork leg. There is a rubber dust cover protecting the jam nut (1). Next to the screw are the letters "H" meaning Hard (slower compression) and "S" meaning Soft (faster compression).

The adjuster has 12 stages of adjustment. Turn the adjuster counter-clockwise for slower compression. To speed up compression, turn the adjuster clockwise. Start with a middle setting and fine tune the compression from there. Proper compression will allow the tire to track the ground over consecutive bumps. Compression that is set too slow will pack-up (feel harsh over consecutive bumps) while compression that is set too fast will cause the fork to bottom out harshly. If the fork is bottoming out, turn the adjuster one turn at a time until the bottoming-out stops. Adjust each fork leg evenly.

Spring Preload Adjustment



The spring preload is adjusted by turning the 19 mm anodized hex nut (2) located on top of the fork spring.

Note: When adjusting preload, always start from the minimum setting and adjust each fork leg evenly.

- Turning the adjustment nut clockwise increases the spring preload and reduces sag of the front suspension.
- Turning the adjustment nut counter-clockwise decreases the spring preload and increases sag of the front suspension.

Factory Supplied Settings

S - ZF7.2 Models	
Adjustment	Setting
Compression	8 clicks counter-clockwise from maximum (H) position.
Preload	7.5 turns clockwise from the full out position
Rebound (tension)	9 clicks counter-clockwise from maximum (H) position
Sag	45 mm (1.77 in.)

DS - ZF7.2 Models	
Adjustment	Setting
Compression	7 clicks counter-clockwise from maximum (H) position.
Preload	5.5 turns clockwise from the full out position
Rebound (tension)	12 clicks counter-clockwise from maximum (H) position
Sag	59 mm (2.32 in.)

S - ZF14.4 Models	
Adjustment	Setting
Compression	6 clicks counter-clockwise from maximum (H) position.
Preload	7.5 turns clockwise from the full out position
Rebound (tension)	9 clicks counter-clockwise from maximum (H) position
Sag	45 mm (1.77 in.)

DS - ZF14.4 Models	
Adjustment	Setting
Compression	6 clicks counter-clockwise from maximum (H) position.
Preload	7.5 turns clockwise from the full out position
Rebound (tension)	11 clicks counter-clockwise from maximum (H) position
Sag	59 mm (2.32 in.)

Rear Shock Adjustments

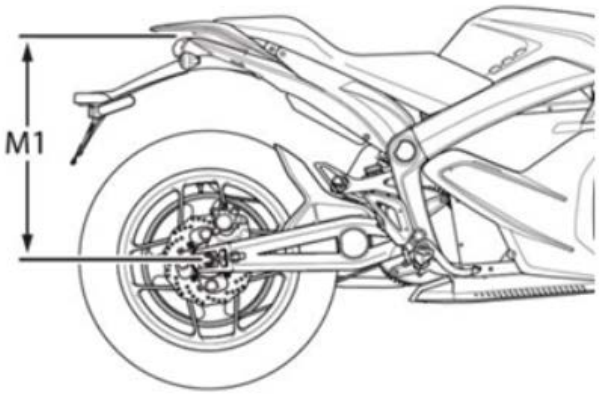
Adjusters should never be forced completely in one direction; always leave on click of adjustment in either direction.

Spring Adjustment

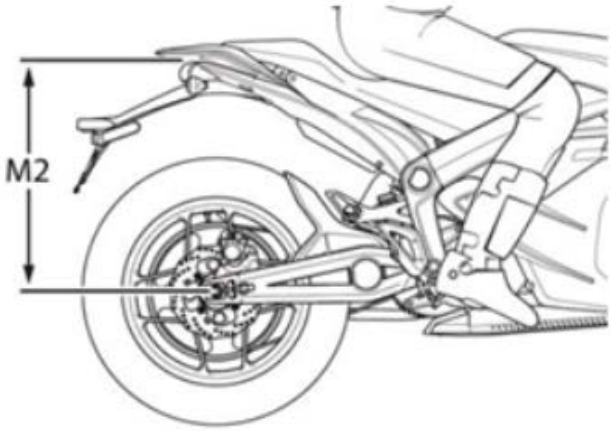
Obtaining the correct rear spring rate is critical for proper handling. The spring rate must be set to match the weight of the rider. The spring is preloaded for an 82 kg (180 lb) rider. Heavier riders require stiffer spring rates. A good approximation of the rear spring requirements can be found by measuring the rear suspension's sag. This measurement will quickly determine if the rear spring is approximately correct for the rider's weight. This adjustment is a recommendation guideline; personal riding preference may vary from the specifications given.

- Checking Sag

1. Support the motorcycle on a stand with the rear wheel off the ground.
2. Measure vertically from the rear axle to the rear fender; mark this spot as it will be used for other measurements.



3. Record this measurement; this will be measurement M1.
4. Remove the motorcycle from the stand.
5. Wearing normal riding apparel, sit on the motorcycle.
6. Have an assistant hold the motorcycle up, your feet should be on both pegs.
7. Bounce the suspension a couple of times.
8. Have a second assistant take a measurement using the same locations as in step 2.



9. Record this measurement; this will be measurement M2.
10. Subtract the second measurement (M2) from the first measurement (M1).

Example:

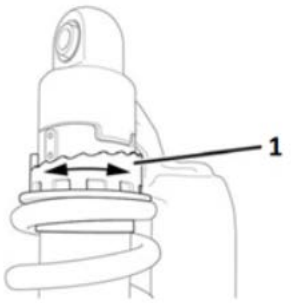
M1		4.13 in. (105 mm)
M2	-	2.36 in. (60 mm)
Sag	=	1.77 in. (45 mm)

The total sag is 1.77 in (45 mm). Refer to the chart below for the correct sag. If the sag is not correct the spring pre-load should be adjusted. Refer to Spring Pre-load Adjustment.

Preferred settings

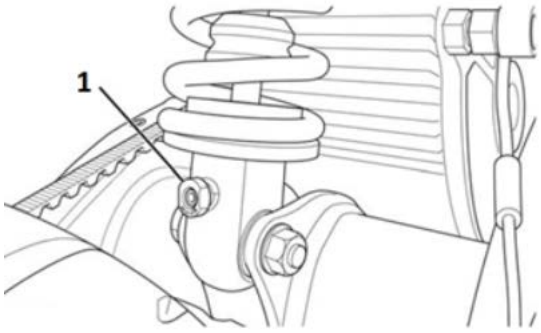
Model	Sag
S, SR	1.77 in. (45 mm)
DS, DSR	2.36 in. (60 mm)

Spring Pre-load Adjustment



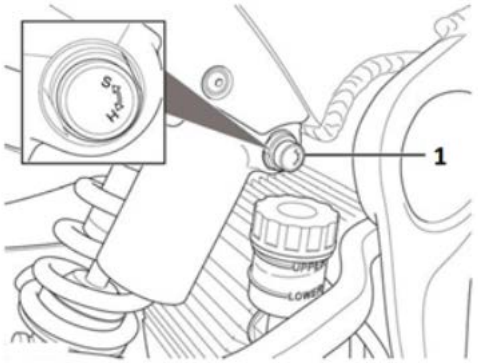
1. Clean any dirt or debris from the slots of the shock adjusting collar (1).
2. Using a lock ring wrench, turn the adjusting collar.
3. For measurements less than the specified value, decrease the pre-load on the spring by turning the adjustment collar counter-clockwise on the shock. If more than the specified value, increase the pre-load on the spring by turning the adjustment collar clockwise on the shock.

Rebound Adjustment



The rebound adjuster knob (1) is at the bottom of the shock. It has 8 stages of adjustment. Printed on the knob is H-S, meaning Hard and Slow. The rebound adjuster knob controls how slow or fast the shock returns to its extended position after being compressed. Turning the knob clockwise, or S direction, is good for big impacts. Turning the knob counter-clockwise, or S direction, is good for many smaller and more frequent impacts.

Compression Adjustment



The compression adjustment knob (1) is at the top of the shock. It has 18 stages of adjustment. Printed on the knob is “H” meaning Hard (slower compression) and “S” meaning Soft (faster compression). Turn the adjuster clockwise for slower compression. To speed up compression, turn the adjuster counter-clockwise. Start with a middle setting and fine tune the compression from there.

Proper compression will allow the tire to track the ground over consecutive bumps. Compression that is set too slow will pack-up (feel harsh over consecutive bumps) while compression that is set too fast will cause the shock to bottom out harshly. If the shock is bottoming out, turn the adjuster one click at a time until the bottom out stops.

See the following table for settings.

Adjustment	Setting
S ZF7.2 Models	
Rear shock compression	14 clicks counter-clockwise from maximum (H) position
Rear shock rebound (tension)	9 clicks counter-clockwise from maximum (H) position
Rear shock spring preload	5th position from minimum unloaded position
DS ZF7.2 Models	
Rear shock compression	10 clicks counter-clockwise from maximum (H) position
Rear shock rebound (tension)	12 clicks counter-clockwise from maximum (H) position
Rear shock spring preload	5th position from minimum unloaded position
S, SR ZF14.4 Models	
Rear shock compression	12 clicks counter-clockwise from maximum (H) position
Rear shock rebound (tension)	6 clicks counter-clockwise from maximum (H) position
Rear shock spring preload	5th position from minimum unloaded position
DS, DSR ZF14.4 Models	
Rear shock compression	13 clicks counter-clockwise from maximum (H) position
Rear shock rebound (tension)	8 clicks counter-clockwise from maximum (H) position
Rear shock spring preload	5th position from minimum unloaded position

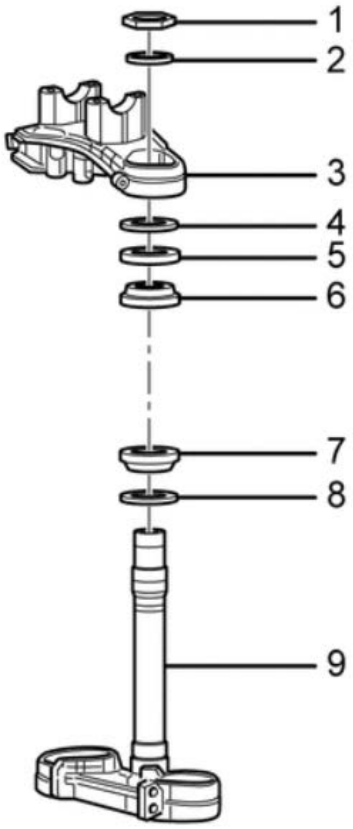
Steering Head Service

Required Tools

- 17 mm hex wrench
- Steering stem lock nut socket
- 16 mm hex wrench
- 41 mm socket
- 6 mm hex wrench
- 5 mm hex wrench
- 3 mm hex wrench

Replacement Parts

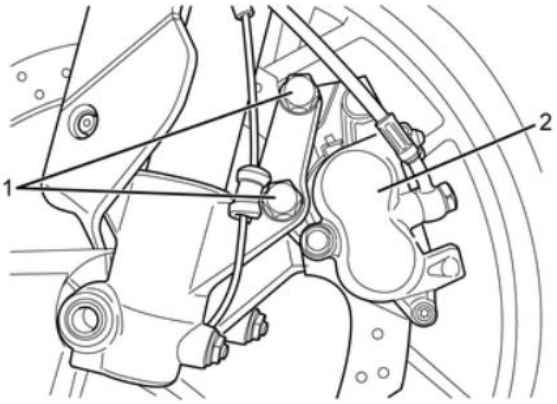
- Dust seals
- Upper and Lower Bearing set
- Lower Triple Clamp Assembly



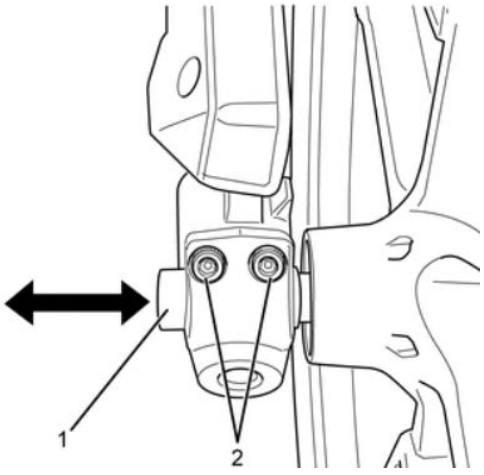
1. Steering Stem Nut
2. Washer
3. Upper Triple Clamp
4. Steering Stem Lock Nut
5. Dust Seal
6. Upper Bearing
7. Lower Bearing
8. Dust Seal
9. Lower Triple Clamp

Removal

1. Remove the key from the key switch and support the motorcycle upright on a stand with the front wheel off the ground.

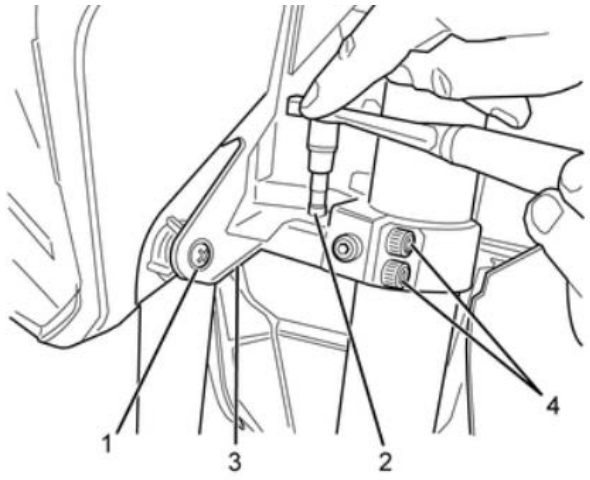


2. Remove two caliper bolts (1). Support the brake caliper (2) with mechanic's wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.
3. Slide the brake caliper off of the brake rotor and support the brake caliper with mechanic's wire or equivalent. DO NOT disconnect the hydraulic brake hose from the brake caliper.

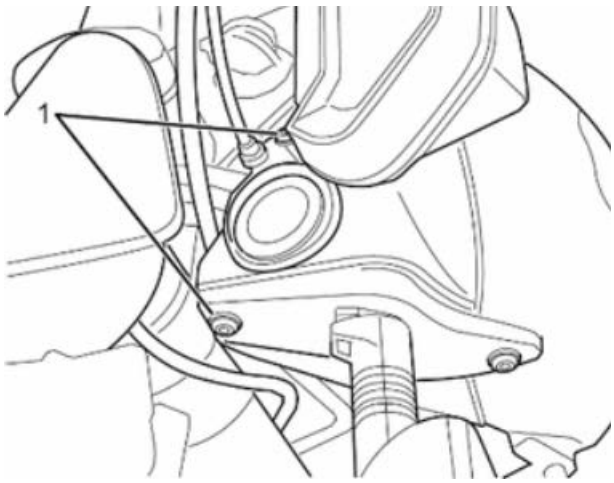


4. Remove the front axle shaft pinch bolts (2) from the right lower fork leg.

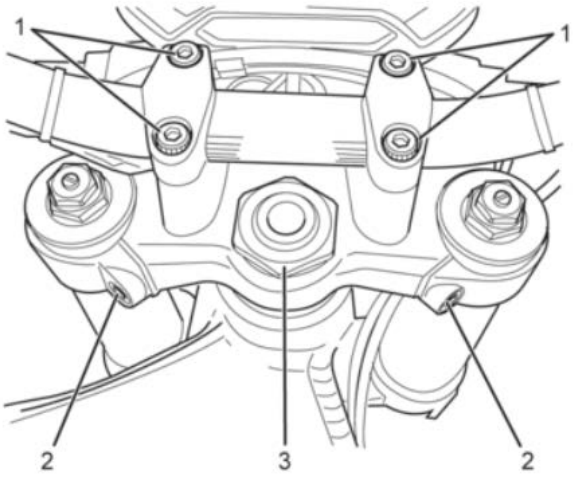
5. Unscrew the front axle (1) then slide the axle out of the fork.
6. Remove sensor wire/brake line clips from the fork guard.
7. Remove the front fender.



8. Remove the lower headlight bolts (1) from both sides.
9. Remove the lower headlight bracket bolts (2) from both sides and the bracket (3).
10. Loosen the lower triple clamp pinch bolts (4) from both sides.



11. Remove the left upper headlight bracket bolts (1) and then remove the right headlight bracket bolts.
12. Hang the headlight and instrument panel assembly forward of the motorcycle and cover them to protect from damage.



13. Remove handlebar bolts (1), clamps, and the handlebar. Lay forward on headlight and instrument panel assembly.
14. Loosen the upper triple clamp pinch bolts (2).
15. Remove steering stem nut and washer (3).
16. Remove upper triple clamp. Place towel between triple clamp and handlebar for protection.
17. Loosen the lower triple clamp pinch bolts.
18. Remove both of the forks from the lower triple clamp.



19. Using a steering stem nut socket (1), remove steering stem lock nut.
20. Remove lower triple clamp assembly from frame.
21. Remove all bearings and dust seals.

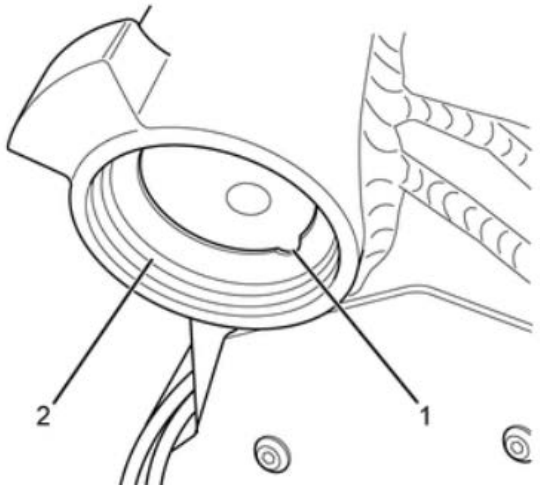
Inspection

1. Clean head tube bore completely.
2. Clean bearing races and steering stem with brake clean or alcohol.
3. Inspect steering stem just above the lower inner race for scoring/gouging of steering stem.

If you find scoring or damage to steering stem, you must replace the lower triple clamp assembly, bearings, and races. If the bearing races are loose in the head tube bores the frame must be replaced.

If scoring/pitting or any other damage is found on the bearings or races, the bearing and races must be replaced.

Bearing Race Replacement



1. The bearing race is pressed into the head tube bore. To remove the race, insert a soft punch into the head tube and carefully tap the race out from the inside. There are notches (1) in the head tube for the punch to get the race started. After it is started, tap around the race to get it out evenly without damaging the head tube bore.

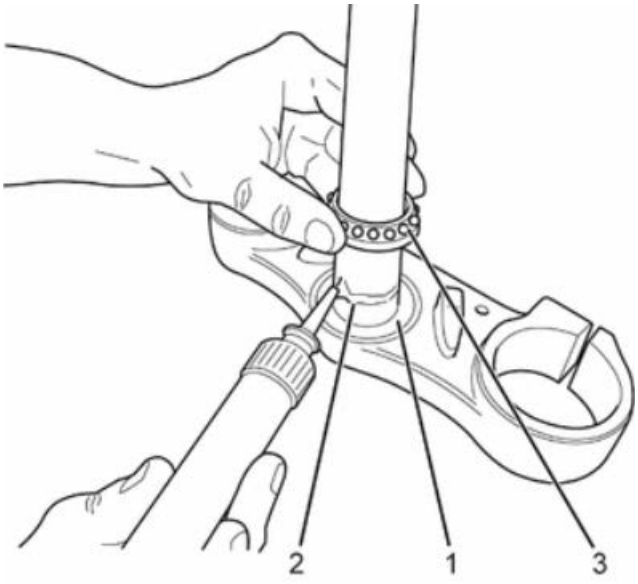
⚠ CAUTION

When the race is removed, it can score the head tube bore. Inspect the head tube bore area (2) for any damage. If any damage is found, smooth bore with 600 grit sandpaper to remove scores or ridges.

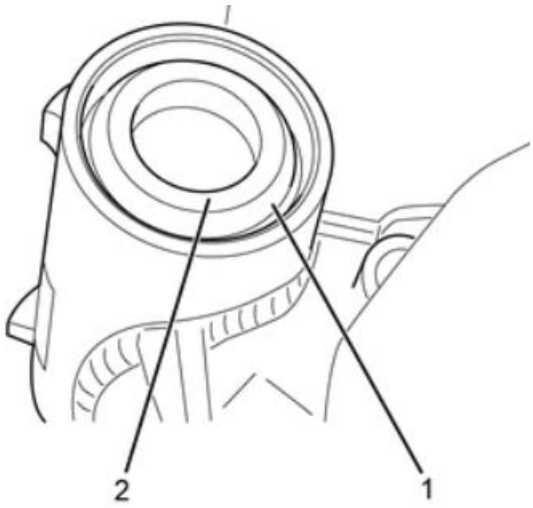
2. Apply Loctite® 609® to sides and bottom of outer race and sides and bottom of head tube bore.
3. Tap the race in slowly and evenly with a race installer or suitable socket. Make sure that the race is squarely seated in the head set bore before tapping it in. Ensure that the race is fully seated in the head tube bore.
4. Wipe residual green Loctite® 609® from race and head tube.

Installation

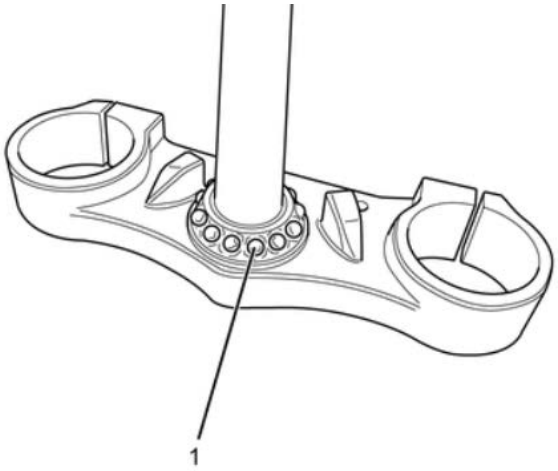
1. Fully pack the bearings with grease. You MUST thoroughly work the grease into the bearings, between the rollers, the core and the cage.



2. Install lower dust seal (1) on the steering stem.
3. Apply Loctite® 609® to steering stem (2) and inner race.
4. Slip the inner race (3) onto stem and rotate 2 full turns to evenly distribute Loctite.
5. Wipe clean any residual Loctite.



6. Install upper bearing (1) and upper inner race (2) into top head tube bore.
7. Install the upper dust seal.



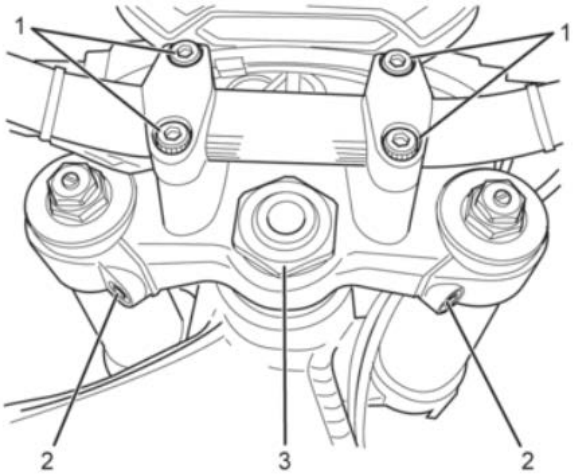
8. Install lower bearing (1) onto the steering stem.
9. Install lower triple clamp assembly into head tube.

Note: Install steering stem lock nut with bevel side down. Take care to keep centered, upward force on lower triple clamp while installing steering stem lock nut so that it is hand-tight. Rotate lower triple clamp and feel for smooth rotation.

10. Using a steering stem lock nut socket tighten the steering stem lock nut to 50 lb-ft (68 Nm) and then back off the nut so that it is hand-tight.
11. Then tighten the steering stem lock nut.
    - Tighten to 25 lb-ft (34 Nm)
12. Rotate lower triple clamp assembly and feel for smooth rotation again.
13. Install upper triple clamp onto steering stem.
14. Check that the routing of brake lines and harness is correct.
15. Install the top washer and nut onto steering stem and leave loose.
16. Install forks into triple clamps.

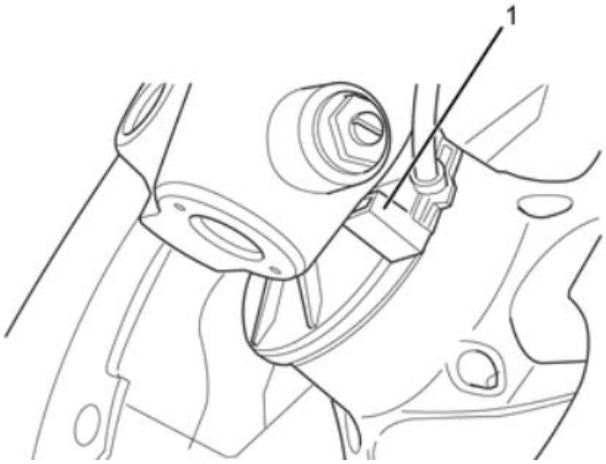


17. Set the top of forks 10 mm (A) from the top of upper triple clamp bore.
18. Apply Loctite® 242® and tighten the lower triple clamp pinch bolts.
    - Tighten to 17 lb-ft (23 Nm)

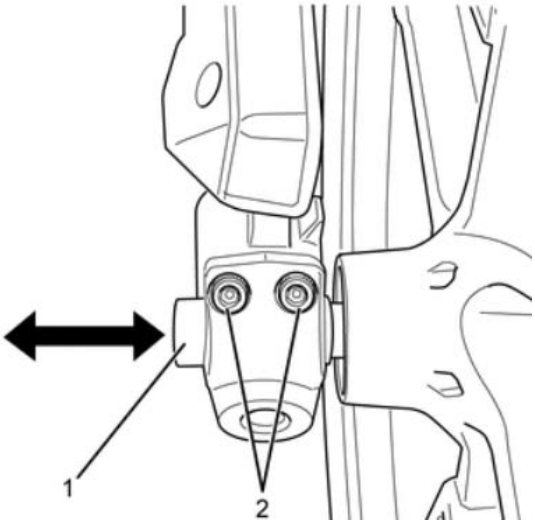


19. Tighten the steering stem nut (3).
    - Tighten to 60 lb-ft (81 Nm)
20. Apply Loctite® 242® and tighten the upper triple clamp pinch bolts (2).
    - Tighten to 15 lb-ft (20 Nm)
21. Install the handlebar, clamps and bolts (1).
    - Tighten to 20 lb-ft (27 Nm)

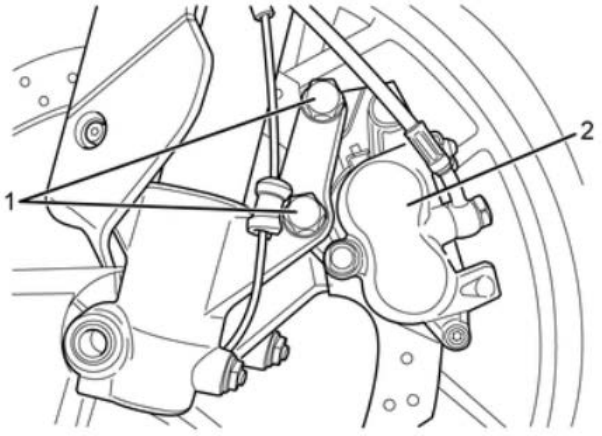
22. Install the headlight and adjuster bolts.
    - Tighten to19 lb-ft (26 Nm)
23. Install the fly-screen. Ensure the ground C239 is between the fly-screen bolts and the bracket.
24. Install the front fender.
25. Install front wheel assembly.



26. Be sure to orient wheel speed sensor to avoid breaking tab (1) on sensor hub.



27. Install the front axle shaft (1).
    - Tighten to 40 lb-ft (54 Nm)
28. Verify that the wheel speed sensor has not moved after torquing axle shaft.
29. Apply Loctite® 242® to the front axle pinch bolts (2).
    - Tighten to 16 lb-ft (22 Nm)
30. Apply Loctite® 242® to the brake caliper bolts.



31. Install the front brake caliper (2) and bolts (1). Ensure that the disc brake pads are centered on the brake rotor.
    - Tighten to 19 lb-ft (26 Nm)
32. Install ABS sensor wire and brake line clamps in the same locations as removed.
33. Let the motorcycle sit for no less than 12 hours to allow Loctite to cure.
34. Adjust the headlight. Refer to Headlight Alignment, page 70-5.
35. Road test the motorcycle to ensure that the condition has been corrected. Refer to Road Testing Procedure, page 1-20.

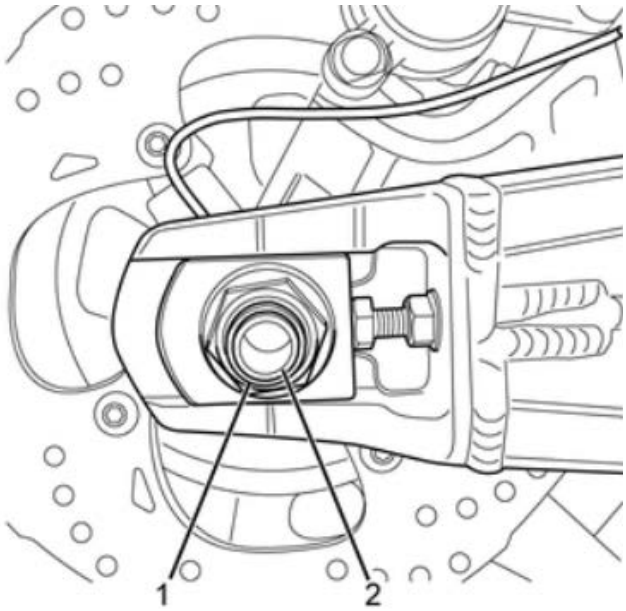
Swingarm Assembly Replacement

Required Tools

- 3 mm hex wrench
- 27 mm socket and socket wrench
- 10 mm hex wrench
- 15 mm wrench
- 17 mm wrench

Removal

1. Remove the 4 bolts securing the rear fender to the swingarm, and remove the fender or fender.
2. Securely raise and support the motorcycle so that the rear wheel is off the ground.

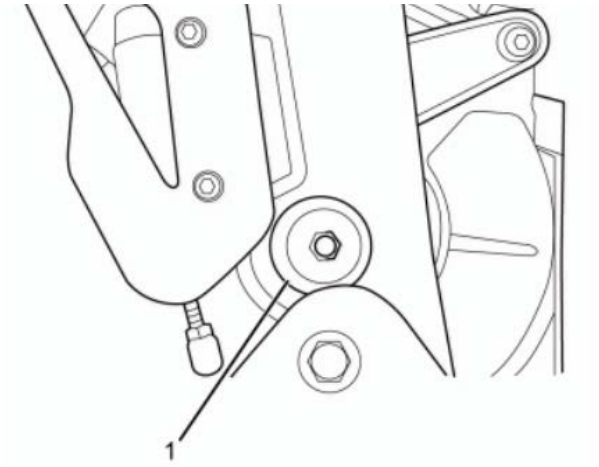


3. Remove the rear axle nut (1) and tap out the axle shaft. Note: There is an axle shaft spacer on the left side of the wheel.
4. Lower the wheel and remove the drive belt from the sprocket.

⚠ CAUTION

Support the brake caliper with mechanic's wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

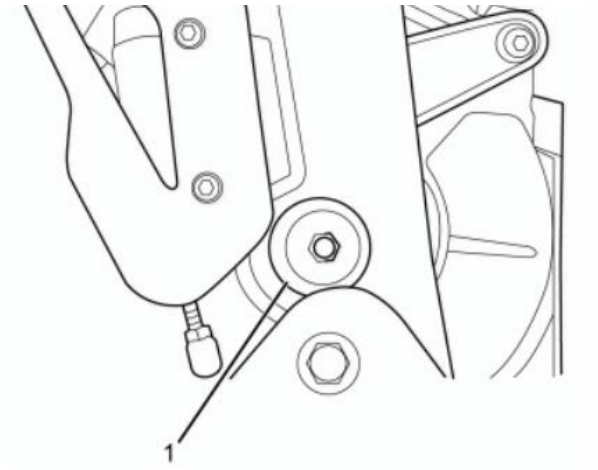
5. Move and support the brake caliper with mechanic's wire or equivalent. DO NOT disconnect the hydraulic brake hose from the brake caliper.
6. Remove the brake pedal pivot bolt.
7. Remove the shock lower nut and bolt.



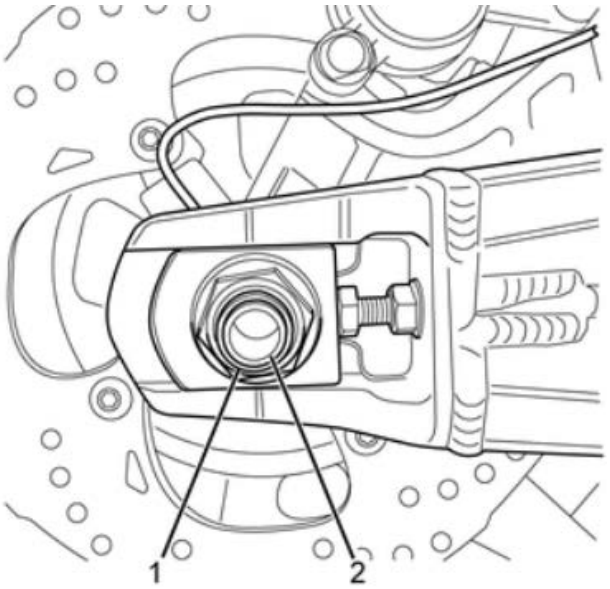
8. Remove the protective rubber cap and pivot bolt (1). Right side shown, left side similar.
9. Remove the swingarm assembly.

Installation

1. Place the swingarm assembly into position.



2. Install the swingarm pivot bolts (1) and tighten. Right side shown, left side similar.
   - Tighten the swingarm pivot bolts to 75 lb-ft (102 Nm)
3. Install the protective rubber caps.
4. Install the shock lower nut and bolt.
   - Tighten the shock nut and bolt to 40 lb-ft (54 Nm)
5. Install the brake pedal pivot bolt.
   - Tighten the brake pedal pivot bolt to 34 lb-ft (46 Nm)
6. Place the caliper into position on the swingarm.
7. Place the drive belt onto the wheel sprocket, ensuring that the left wheel spacer is in place.
8. Move the wheel into position. Ensure that the brake rotor is centered between the brake pads, and the ABS sensor is in place.



9. Slide the axle shaft (2) through the swingarm and wheel and install the nut (1).
   - Tighten the axle shaft nut to 75 lb-ft (102 Nm)
10. Install the fender, ground strap and brake line clips onto the swingarm.

Hydraulic Brake System Description and Operation

General Information

Bleed the hydraulic brake system any time a brake hose, ABS HCU, master cylinder or brake caliper has been opened or disassembled, or whenever the brake lever operation feels "spongy." Bleeding evacuates air from the system leaving only incompressible hydraulic fluid. This system requires a special bleeding procedure.

⚠ CAUTION

Use only fresh, uncontaminated DOT 4 brake fluid. Fluid containers that have been opened may have been contaminated by dirt or moisture. Use of contaminated brake fluid may adversely affect braking ability and lead to brake failure which could result in death or serious injury.

Note: Cover adjacent surfaces when removing, draining, filling and/or bleeding brake system components. Spilling brake fluid on painted or other finished surfaces can result in cosmetic damage. Immediately wipe up any spilled brake fluid and thoroughly clean affected area.

System Component Description

The hydraulic brake system consists of the following:

Hydraulic Brake Master Cylinder

• Contains the supply of brake fluid for the hydraulic brake system.

• Converts mechanical input force (brake lever/ pedal) into hydraulic output pressure.

The amount of stroke required for this stage will depend of the amount of clearance between the pads and disc.

• Modulation

The brake pads are now clamping the rotor and by stroking the lever further, additional brake power will be generated.

Hydraulic Brake Flexible Hoses

Carry brake fluid to and from hydraulic brake system components.

Hydraulic Brake Wheel Apply Components

Convert hydraulic input pressure into mechanical output force.

System Operation

The front brake is controlled by a hand-operated master cylinder located on the right handlebar. The rear brake is controlled by a foot-operated master cylinder next to the right foot peg. The master cylinder converts mechanical force into hydraulic pressure. Brake flexible hoses form the hydraulic brake wheel circuits and deliver the hydraulic pressure to the brake calipers. The brake calipers convert the hydraulic pressure into mechanical force which presses linings against rotating brake rotors.

Anti-Lock Brake System (ABS) Description and Operation

General Information

Bleed the hydraulic brake system any time a brake hose, ABS module, master cylinder or brake caliper has been opened or disassembled, or whenever the brake lever operation feels "spongy." Bleeding evacuates air from the system leaving only incompressible hydraulic fluid. This system requires a special bleeding procedure.

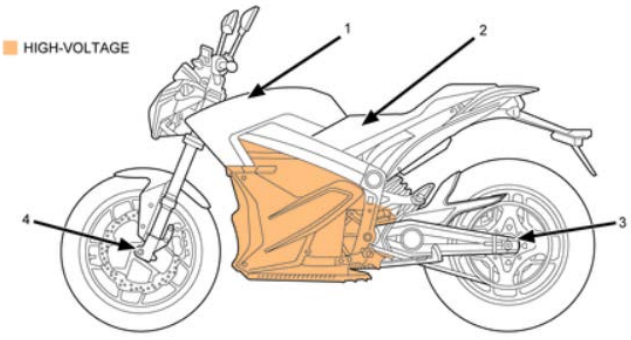
⚠ CAUTION

Use only fresh, uncontaminated DOT 4 brake fluid. Fluid containers that have been opened may have been contaminated by dirt or moisture. Use of contaminated brake fluid may adversely affect braking ability and lead to brake failure which could result in death or serious injury.

⚠ CAUTION

Cover adjacent surfaces when removing, draining, filling and/or bleeding brake system components. Spilling brake fluid on painted or other finished surfaces can result in cosmetic damage. Immediately wipe up any spilled brake fluid and thoroughly clean affected area.

ABS Major Component Locations



1. ABS Hydraulic Control Unit (HCU)



2. ABS Module Fuse (25 amp)



3. Rear Wheel Speed Sensor



4. Front Wheel Speed Sensor



The ABS consists of the following components:

- A conventional hydraulic brake system
- Antilock components

The conventional brake system includes the following components:

- A rear master cylinder
- A front master cylinder
- Front disc brake
- Rear disc brake
- Interconnecting hydraulic brake lines

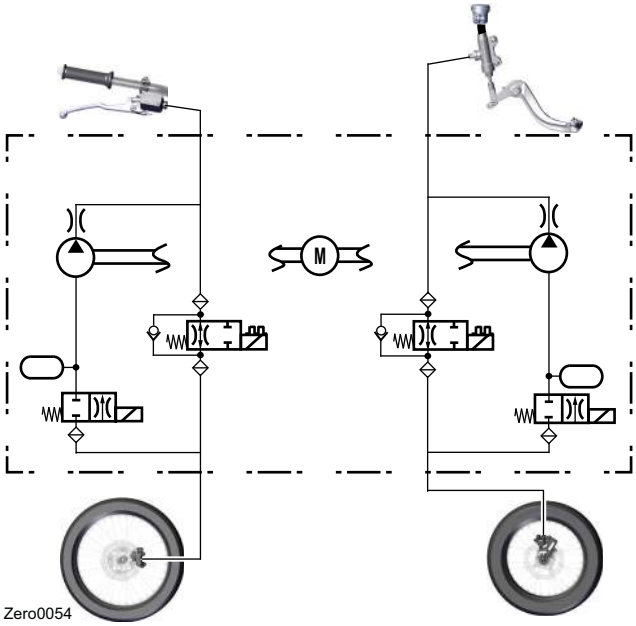
The ABS includes the following components:

- An ABS Hydraulic Control Unit (HCU)
- Two wheel speed sensors
- The interconnecting wiring
- An amber ABS warning indicator

The ABS HCU controls hydraulic pressure to the following areas:

- The front caliper
- The rear caliper

The ABS HCU controls hydraulic pressure by modulating the hydraulic pressure. This action prevents wheel lock-up.



The HCU constantly monitors the rotational speed of the front and back wheel; if it detects a wheel rotating significantly slower than the other, a condition indicative of impending wheel lock, it actuates the valves to reduce hydraulic pressure to the brake at the affected wheel, thus reducing the braking force on that wheel; the wheel then turns faster. Conversely, if the HCU detects a wheel turning significantly faster than the other, brake hydraulic pressure to the wheel is increased so the braking force is reapplied, slowing down the wheel. This process is repeated continuously.

The HCU is programmed to disregard differences in wheel rotation speed below 5 mph.

If a fault develops in any part of the ABS, a warning light will illuminated on the instrument panel, and the ABS will be disabled until the fault is corrected.

The diagnostic codes are held in the system and require a special cable to connect to it and retrieve the fault codes.

Diagnostics - Non-ABS

Brakes Drag

Causes	Correction
Sticky caliper or caliper pistons	Replace the caliper.
Contaminated or improper brake fluid	Flush the brake system and repair the affected brake components.
Loose front or rear brake assembly components	Locate and tighten the loose brake components.
Brake lever/pedal binding	Repair or replace the brake lever/pedal.

Brake Lever Travel Gradually Increases

Causes	Correction
Leaking brake hose or connection	Locate and repair the brake hose or the connection.
Leaking caliper piston seal	Replace the caliper.
Leaking master cylinder (internally)	Replace the master cylinder.

Brake System Groan at End of Stop

Causes	Correction
Linings damaged by abusive use	Replace the brake linings.
Poor rotor surface finish	Replace the rotor.

Brake System Noise with Brakes Not Applied

Causes	Correction
Worn-out brake linings	Replace the brake linings.
Incorrect lining material	Replace the brake linings.
Contaminated brake linings	Replace the brake linings.
Linings damaged by abusive use	Replace the brake linings.
Scored rotor	Replace the rotor. Inspect and replace brake linings if necessary.

Brake System Slow to Release

Causes	Correction
Contaminated or improper brake fluid	Flush the brake system and repair the affected brake components.
Sticky caliper pistons	Replace the caliper.

Excessive Brake Lever/Pedal Effort

Causes	Correction
Glazed brake linings	Replace the brake linings.
Worn-out brake linings	Replace the brake linings.
Incorrect lining material	Replace the brake linings.
Contaminated brake linings	Replace the brake linings.
Linings damaged by abusing use	Replace the brake linings.
Restricted brake fluid passage	Locate and repair the brake fluid passage restriction.
Brake lever/pedal interference or binding	Repair or replace the brake lever/pedal.

Excessive Brake Lever/Pedal Travel

Causes	Correction
Air in the brake system	Bleed the brake system.
Leaking brake hose or connection	Locate and repair the brake hose or the connection.
Leaking caliper piston seal	Replace the caliper.
Leaking master cylinder (internally)	Replace the master cylinder.
Contaminated/improper brake fluid	Flush the brake system and repair the affected brake components.
Loose front or rear brake assembly components	Locate and tighten loose brake components.

Diagnostic Starting Point

If a malfunction occurs in the ABS system, the amber ABS warning indicator will turn on during the ignition cycle during which the malfunction is detected.

A diagnostic trouble code will store under the following conditions:

- The malfunction is current
- The malfunction is intermittent

The diagnostic codes are held in the system and require a special cable to connect to it and retrieve the trouble codes.

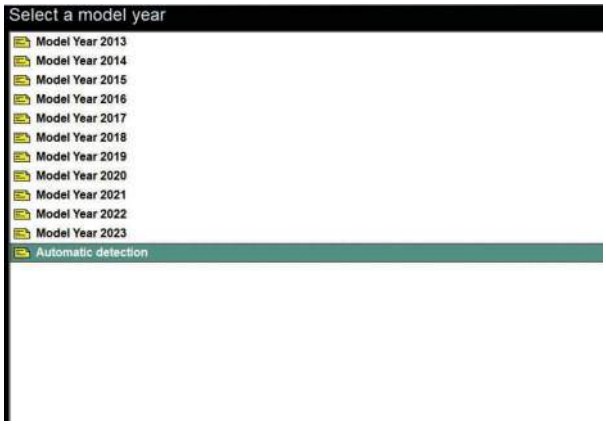
Refer to Diagnostic Trouble Code (DTC) List, page 10-6.

ABS Diagnostics

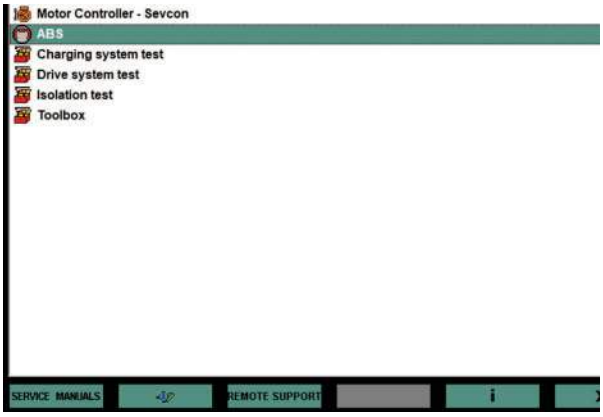
1. Connect the motorcycle to Diag4Zero and turn the key on.
2. Double click the Diag4 icon.



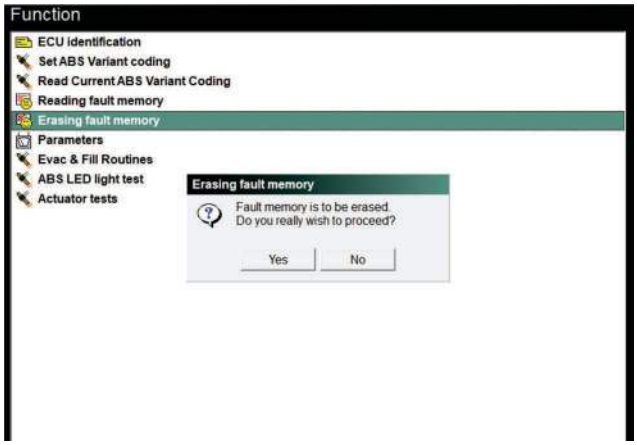
3. Select “Troubleshooting”.



4. Select the model year or select “Automatic detection”.



5. Select “ABS”.



Select “Erasing fault memory” and click on “Yes”.

Disabling the Anti-Lock Brake System (ABS)

It may be necessary to temporarily disable the Bosch ABS system to further diagnose the hydraulic brake system.

Under normal operation, the ABS dash light will turn on when the motorcycle is keyed on. The ABS light will remain lit until both wheels reach 3 mph (5 km/h), at which time the ABS light should turn off. If the ABS light remains on, there may be an ABS fault, and the rider is advised that the ABS is NOT active.

To disable the ABS:

1. Ensure motorcycle is at rest on a level, stable surface.
2. Place side (kick) stand in down position.
3. Place motorcycle ignition (kill) switch in OFF position.
4. Turn key switch to ON position.
5. Press and hold the MODE and ADJ buttons on the dash. After four (4) seconds, the ABS light will begin to blink quickly (faster than once per second). Continue holding MODE and ADJ until the ABS light flashes slowly (approximately every 1.2 seconds), and then release.

To reactivate the ABS:

1. Ensure motorcycle is at rest on a level, stable surface.
2. Disconnect the motorcycle from external charge cables.
3. Turn key switch to OFF position.
4. Wait for dash display to turn off completely.
5. Turn key switch to ON position.
6. Resume normal operation.

When the motorcycle is turned off, upon restarting, the ABS will automatically return to its ON setting.

Brake Pad Inspection

The brake pads must be inspected when specified in the maintenance schedule. Visually inspect the brakes by looking at the remaining brake pad material through the sides of the brake caliper.

Replace the brake pads if either pad's thickness is 0.053 in (1.35 mm) or less. If the brake pads are worn, replace both brake pads immediately.

Brake Disc Inspection

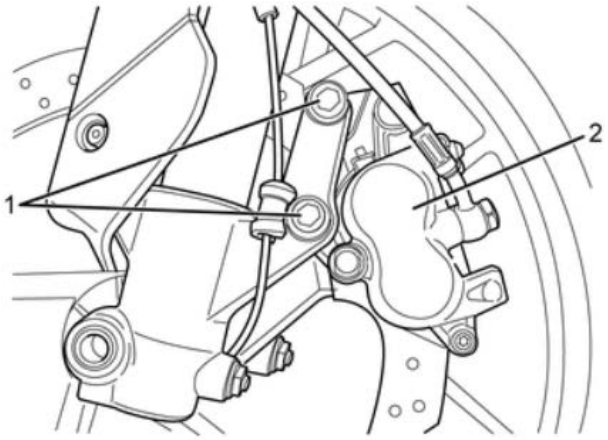
The thickness of the brake discs should be checked regularly. The minimum thickness is 0.14 in (3.50 mm).

Brake Pad Replacement - Front

Required Tools

- Flat blade screwdriver
- T25 star socket
- 8 mm hex wrench

Removal Procedure



1. Remove the two caliper bolts (1).

⚠ CAUTION

Support the brake caliper (2) with mechanic's wire, or equivalent, whenever it is separated from its mount, and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

2. Slide the brake caliper off of the brake rotor and support the brake caliper with mechanic's wire or equivalent. DO NOT disconnect the hydraulic brake hose from the brake caliper.

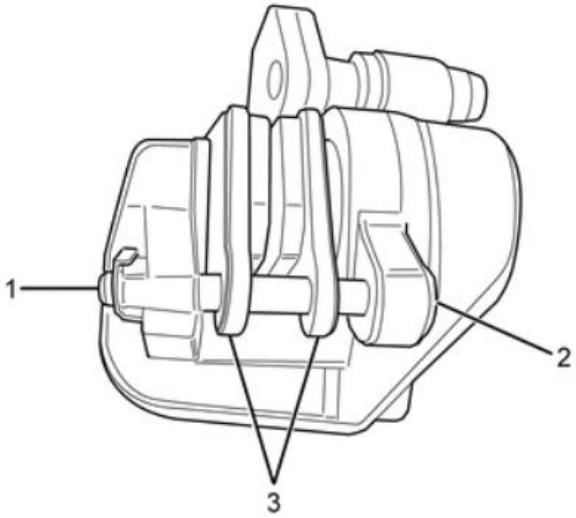
⚠ CAUTION

To prevent dirt and other contaminants from entering the master cylinder, thoroughly clean the cover before removal.

3. Remove the two screws to release the cover from the front master cylinder reservoir.

Note: As the pistons are pushed back into the caliper, the fluid level may rise and overflow the reservoir. Watch the fluid level as the pistons are retracted and remove fluid from the reservoir if necessary.

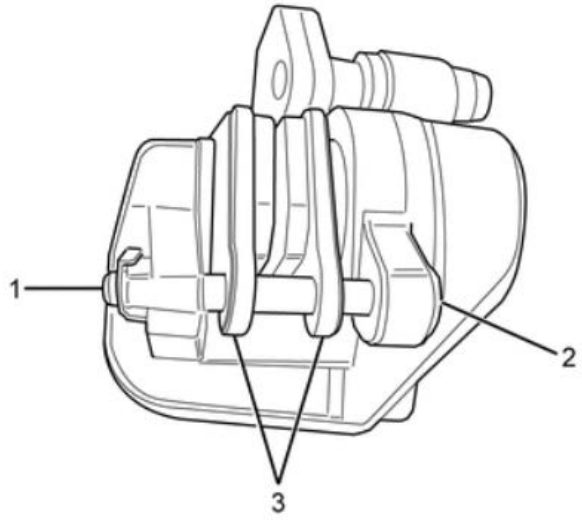
4. Press in the inner and outer brake pads pushing the pistons back into their bores.



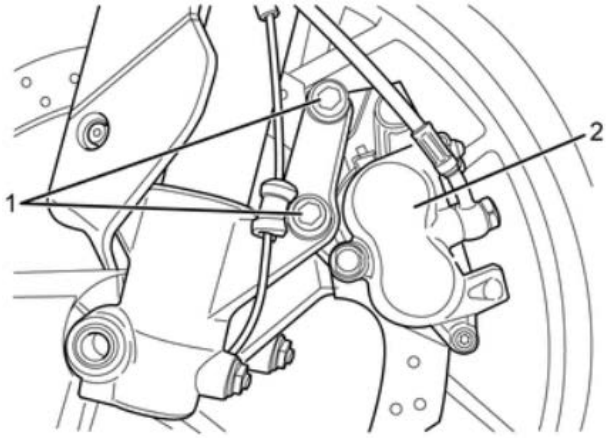
5. Remove the caliper slide pin clip (1).
6. Remove the caliper slide pin (2), and remove the pads from the caliper.
7. Inspect the brake caliper and brake hardware and replace as needed.

Installation Procedure

1. Install the disc brake pads into the brake caliper, making sure that the anti-rattle clip is in position.
2. Press the brake pads into the caliper so that the slide pin will line up.



3. Install caliper slide pin (2) and tighten.
4. Install the caliper slide pin clip (1).



5. Slide the brake caliper (2) onto the rotor, making sure that the disc brake pads are centered on the brake rotor.
6. Install the front caliper bolts (1).
   - Tighten to 19 lb-ft (26 Nm)

⚠ CAUTION

After installation of new pads, and before moving motorcycle, pump the front brake lever to build brake system pressure. Insufficient pressure can adversely affect brake performance, which could result in death or serious injury.

7. Verify that brake fluid level is full. Add DOT 4 brake fluid, if necessary.
8. Install master cylinder reservoir cover.

⚠ CAUTION

After completing repairs or bleeding the system, always test motorcycle brakes at low speed. If brakes are not operating properly or braking efficiency is poor, testing at a high speed could result in death or serious injury.

9. Gently use the brakes a few times at low speeds (less than 25 mph [40 km/h]) to develop proper braking friction. With new brake systems or just new pads, the first few braking applications will result in very little braking power.
10. Perform the brake pad bedding procedure. See Brake Bedding, page 45-11.

Brake Pad Replacement - Rear

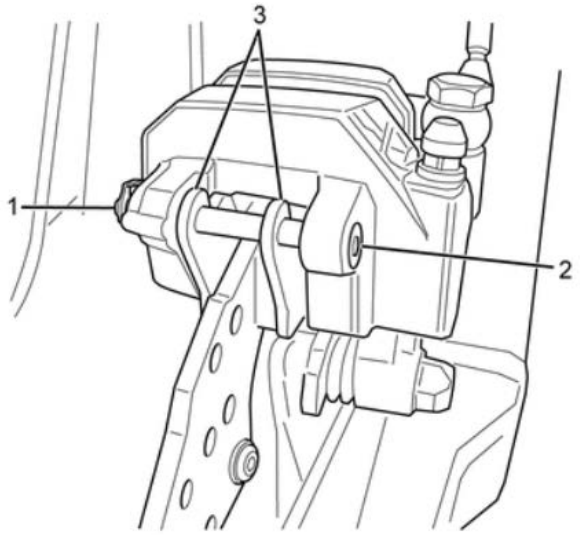
Required Tools

- T25 star socket

Removal

⚠ CAUTION

Always replace brake pads in pairs. Never replace just one brake pad. Mismatched brake pads can lead to brake system damage and loss of braking performance, which could result in serious injury or death.



1. Remove the caliper slide pin clip (1).
2. Remove the caliper slide pin (2).

⚠ CAUTION

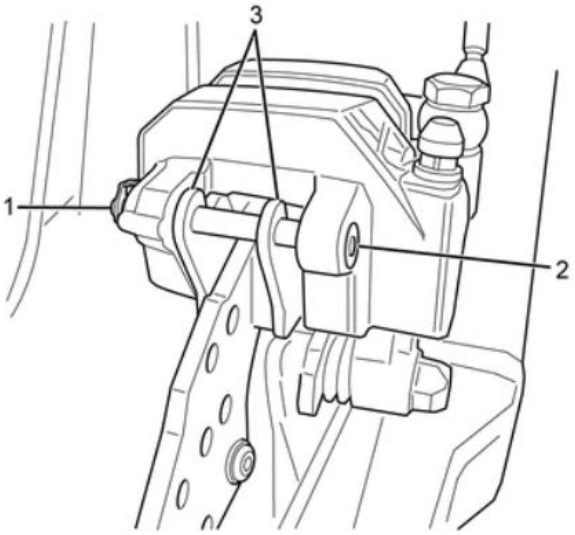
To prevent dirt and other contaminants from entering the master cylinder, thoroughly clean the cover before removal.

3. Remove the brake fluid reservoir cap from the reservoir.

Note: As the piston is pushed back into the caliper, fluid level may rise and overflow the reservoir. Watch the fluid level as the piston is retracted and remove fluid from the reservoir if necessary.

4. Press in the inner and outer brake pads pushing the piston back into the bore.
5. Remove the disc brake pads (3) from the brake caliper.
6. Inspect the brake caliper and brake hardware and replace as needed.

Installation



1. Install the disc brake pads (3) into the brake caliper, making sure that the anti-rattle clip is in position.
2. Install the caliper slide pin (2).
   - Tighten Brake caliper slide pin to 34 lb-ft (46 Nm)
3. Install the caliper slide pin clip (1)

⚠ CAUTION

After installation of new pads and before moving motorcycle, pump the rear brake pedal to build brake system pressure. Insufficient pressure can adversely affect brake performance, which could result in death or serious injury.

4. Verify that brake level fluid is full. Add DOT 4 brake fluid, if necessary.

5. Install master cylinder reservoir cap.

⚠ CAUTION

After completing repairs or bleeding the system, always test motorcycle brakes at low speed. If brakes are not operating properly or braking efficiency is poor, testing at a high speed could result in death or serious injury.

6. Gently use the brakes a few times at low speeds (less than 25 mph [40 km/h]) to develop proper braking friction. With new brake systems or just new pads, the first few braking applications will result in very little braking power.
7. Perform the brake pad bedding procedure. See Brake Bedding, page 45-11.

Brake Bedding

Note: Bedding in new brake systems or new pads is recommended to ensure proper brake performance and maximize brake life. Proper bedding improves brake pedal/lever feel and reduces or eliminates brake squeal. Bedding in the brakes is a process of depositing an even layer of pad material on the surface of the brake rotor.

⚠ CAUTION

With new brake systems or just new pads, the first few braking applications will result in very little braking power. Gently use the brakes a few times at low speeds (<25 mph) to develop proper braking friction.

Process

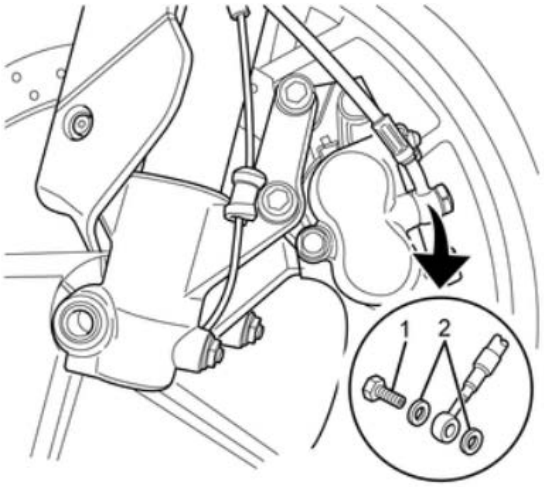
1. Begin at 40 mph (64 km/h) and gradually apply the brake to reduce speed to 10 mph (16 km/h). Avoid locking the tires or triggering the ABS, and do not come to a complete stop to prevent pad material from adhering to the rotor which can cause vibration.
2. Accelerate back to 40 mph (64 km/h) and repeat this process 15-20 times, ensuring you work on the front and rear brakes separately.
3. After completing 15-20 cycles for both the front and rear brakes, take a 10 mile (16 km) ride to allow the braking system to cool down.

Brake Caliper Replacement-Front

Required Tools

- 14 mm wrench
- 8 mm hex wrench

Removal

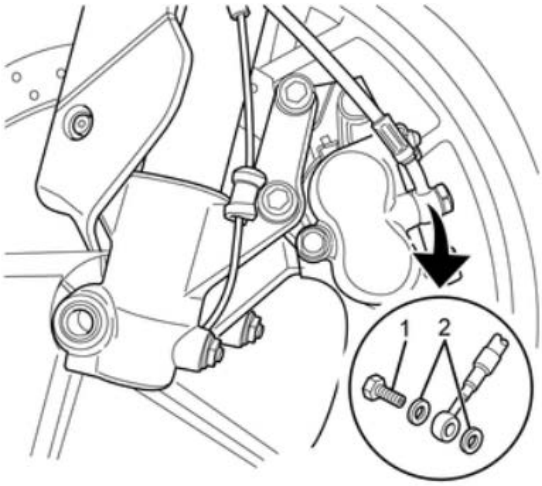


1. Remove the brake pads. Refer to Brake Pad Replacement - Front, page 45-8.
2. Remove the front brake hose banjo bolt (1) and sealing washers (2) from the caliper.
3. Drain the brake fluid into an approved container.

Installation

⚠ CAUTION

Always use new sealing washers on the banjo fittings.



1. Install the front brake hose to the caliper with the banjo bolt (1) and new sealing washers (2).
   - Tighten Banjo bolt to 23 lb-ft (31 Nm)
2. Install the brake pads. Refer to Brake Pad Replacement - Front, page 45-8.
3. Bleed the front brake system.
4. If new pads have been installed, perform the brake pad bedding procedure. See Brake Bedding, page 45-11.
5. Road test the motorcycle. Refer to Road Testing Procedure, page 1-20.

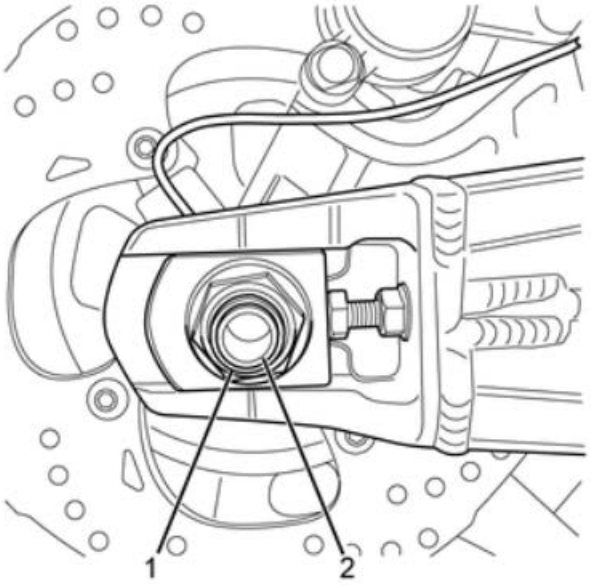
Brake Caliper Replacement-Rear

Required Tools

- 27 mm socket
- T25 Star socket and socket wrench
- 14 mm wrench

Removal

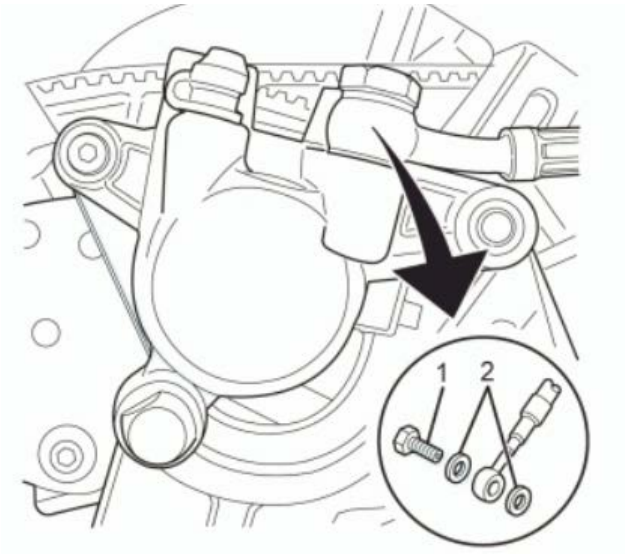
1. Remove the brake pads. Refer to Brake Pad Replacement - Rear, page 45-10.
2. Securely raise and support the motorcycle so that the rear wheel is off the ground.



3. Remove the rear axle nut (1) and tap out the axle shaft (2).

Note: Be aware of the axle shaft spacer on the left side of the wheel.

4. Lower the wheel and remove the drive belt from the sprocket.
5. Separate the brake caliper mounting bracket from the swingarm.



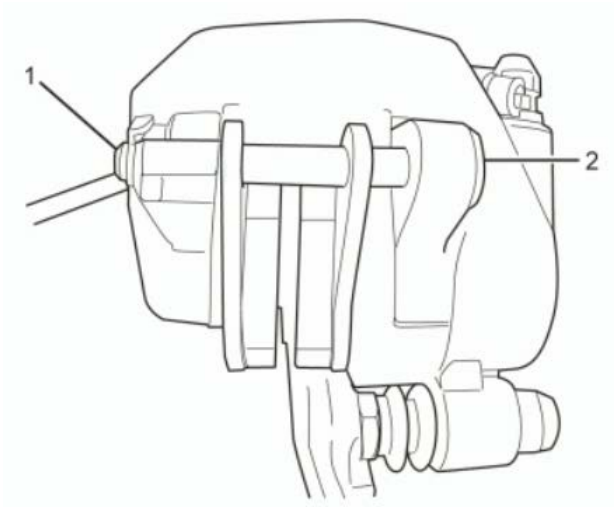
6. Remove the rear brake hose banjo bolt (1) and sealing washers (2) from the caliper.
7. Drain the brake fluid into an approved container.

Installation

⚠ CAUTION

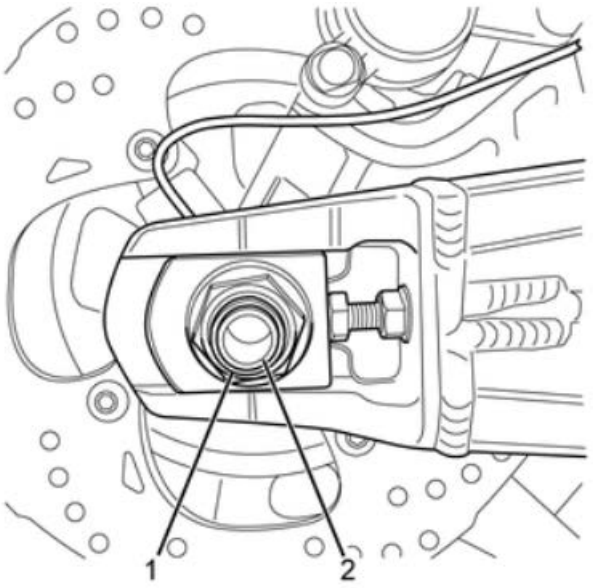
Always use new sealing washers on the banjo fittings.

1. Install the disc brake pads into the brake caliper, making sure that the anti-rattle clip is in position.

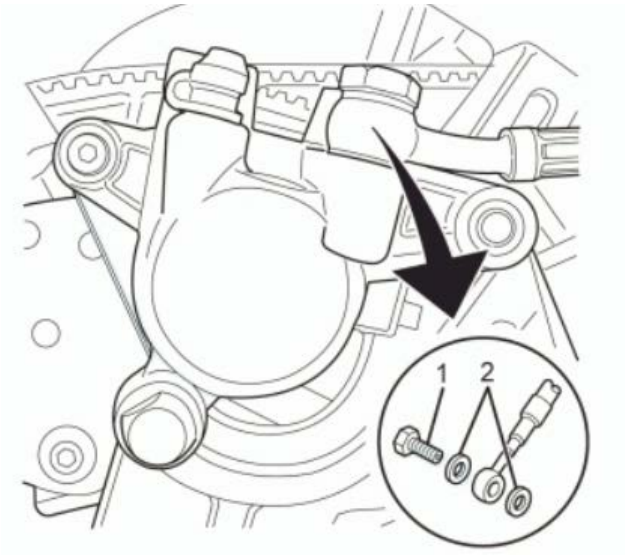


2. Install the caliper slide pin (2).
   - Tighten caliper slide pin to 34 lb-ft (46 Nm)
3. Install the caliper slide pin clip (1).

4. Place the caliper into position on the swingarm.
5. Place the drive belt onto the wheel sprocket, ensure that left wheel spacer and the ABS sensor are in place.
6. Move the wheel into position, ensuring that the brake rotor is centered between the brake pads.



7. Slide the axle shaft (2) through the swingarm and wheel and install the nut (1).
   - Tighten axle shaft nut to 75 lb-ft (102 Nm)



8. Install the rear brake hose to the caliper with the banjo bolt (1) and new sealing washers (2).
   - Tighten banjo bolt to 23 lb-ft (31 Nm)
9. Bleed the rear brake system.
10. If new pads have been installed, perform the brake pad bedding procedure. See Brake Bedding, page 45-11.
11. Road test the motorcycle. Refer to Road Testing Procedure, page 1-20.

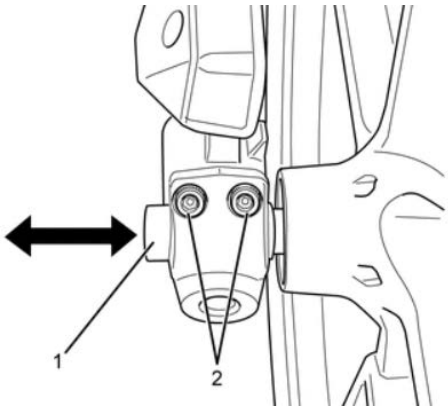
Brake Rotor Replacement-Front

Required Tools

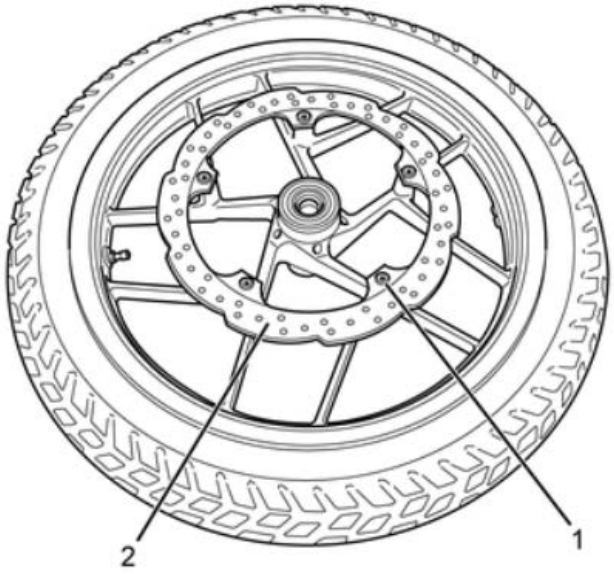
- 16 mm hex wrench
- 6 mm hex wrench

Removal

1. Remove the front wheel.
   a. Raise and support the motorcycle.



   b. Remove the front axle shaft pinch bolts (2) from the right lower fork leg.
   c. Unscrew the front axle (1) then slide the axle out of the fork.



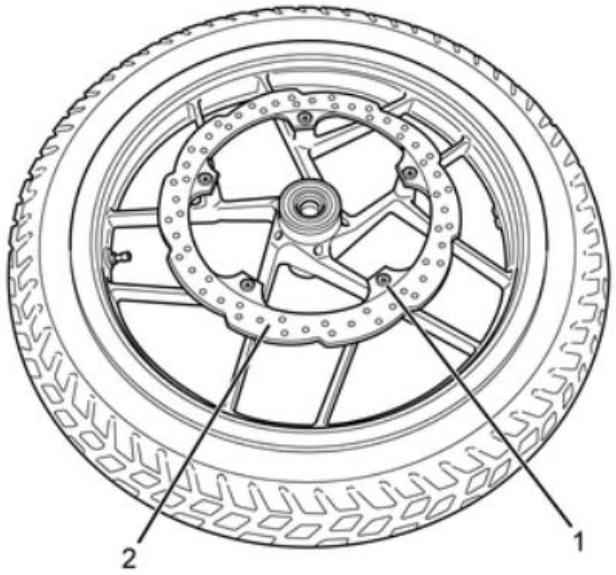
2. Remove the 5 Allen bolts (1) securing the rotor to the wheel.
3. Remove the front brake rotor (2) from the wheel.

Installation

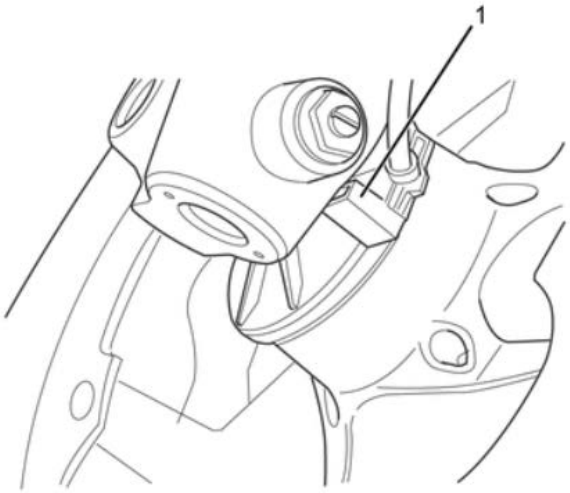
⚠ CAUTION

Whenever the rotor has been separated from the wheel flange, any rust or contaminants must be cleaned from the wheel flange and the rotor mating surfaces. Failure to do this may result in excessive assembled lateral runout (LRO) of the brake rotor, which could lead to brake pulsation.

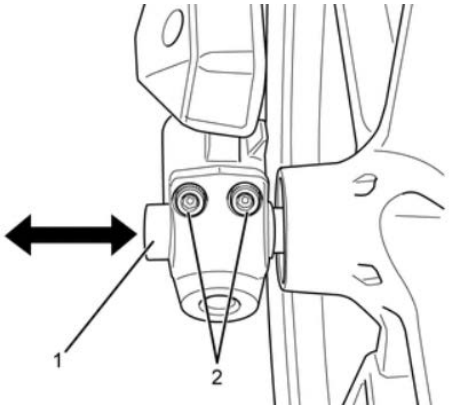
1. Inspect the rotor and wheel flange surface for rust or contamination. Remove rust or contamination if necessary. Clean all fastener threads of Loctite, oil, or grease.



2. Install the brake rotor (2) onto the wheel flange; make sure that the countersunk portion of the brake rotor is facing out.
3. Apply Loctite® 242® to the threaded portion of the rotor bolts (1) and tighten into the flange.
   - Tighten front rotor bolts to 19 lb-ft (26 Nm)
4. Install the front wheel.
   a. Position the wheel onto the motorcycle and ensure that the brake pads are on each side of the brake rotor.



b. Position the ABS sensor between the wheel and the left fork tube. The anti-rotation tab (1) must be installed as shown.



c. Apply Anti-Seize (or equivalent) and slide the front axle shaft (1) through both fork legs and the wheel, making sure that the ABS sensor is in place, and tighten.

- Tighten axle shaft (1) to 19 lb-ft (26 Nm)
- Tighten the front axle pinch bolts (2).
- Tighten axle pinch bolts to 9 lb-ft (12 Nm)

5. Perform the brake pad bedding procedure. See Brake Bedding, page 45-11.
6. Road test the motorcycle. Refer to Road Testing Procedure, page 1-20.

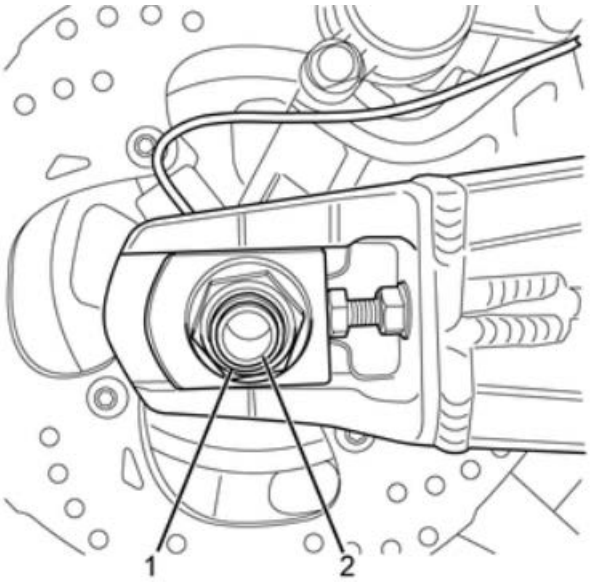
Brake Rotor Replacement-Rear

Required Tools

- 5 mm hex wrench
- 27mm socket and socket wrench

Removal

1. Remove the rear wheel.
   a. Securely raise and support the motorcycle so that the rear wheel is off the ground.



   b. Remove the rear axle nut (1) and tap out the axle shaft (2).

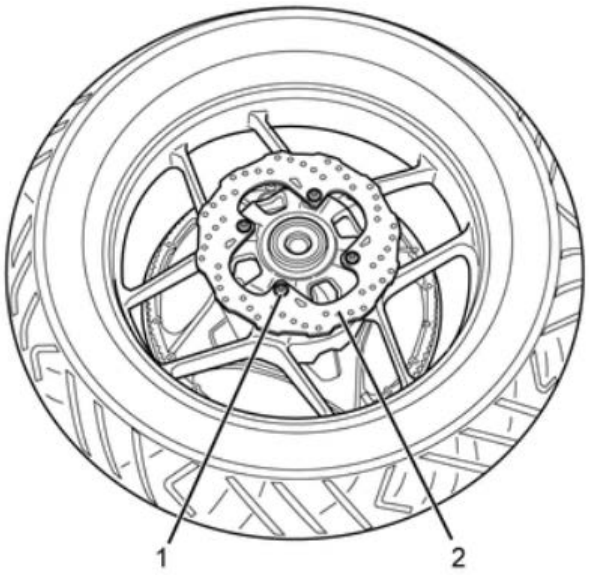
Note: Be aware of the axle shaft spacer on the left side of the wheel.

   c. Lower the wheel and remove the drive belt from the sprocket.

⚠ CAUTION

Support the brake caliper with mechanic's wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

2. Move and support the brake caliper with mechanic's wire or equivalent. DO NOT disconnect the hydraulic brake hose from the brake caliper.



3. Remove the 4 Allen bolts (1) securing the rotor to the wheel.
4. Remove the rear brake rotor (2) from the wheel.

Installation

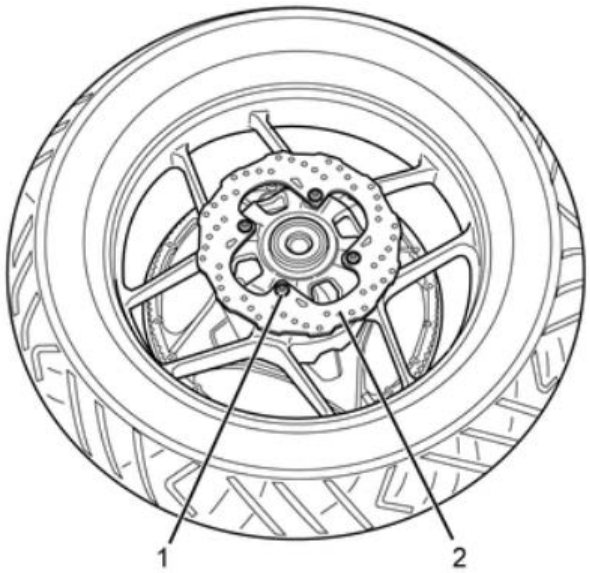
⚠ CAUTION

Whenever the rotor has been separated from the wheel flange, any rust or contaminants must be cleaned from the wheel flange and the rotor mating surfaces. Failure to do this may result in excessive assembled lateral runout (LRO) of the brake rotor, which could lead to brake pulsation.

⚠ CAUTION

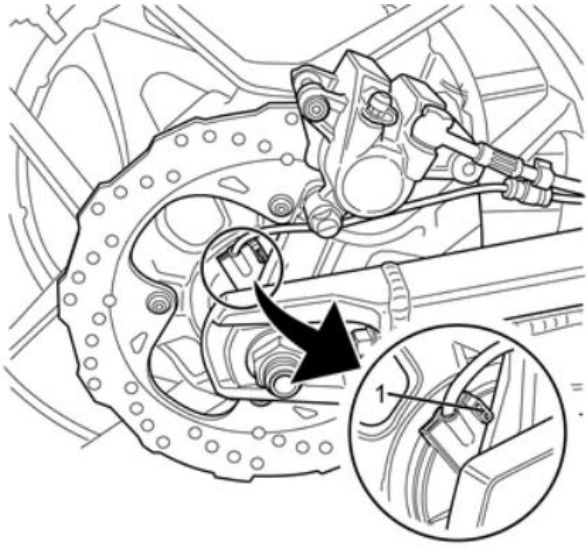
Placement of the anti-rotation tab (1) of the ABS sensor is critical. Failure to install the anti-rotation tab in the correct location will cause sensor damage or failure. The anti-rotation tab must be installed outside of the rear brake caliper housing.

1. Inspect the rotor and wheel flange surface for rust or contamination. Remove rust or contamination if necessary. Clean all fastener threads of Loctite®, oil, or grease.

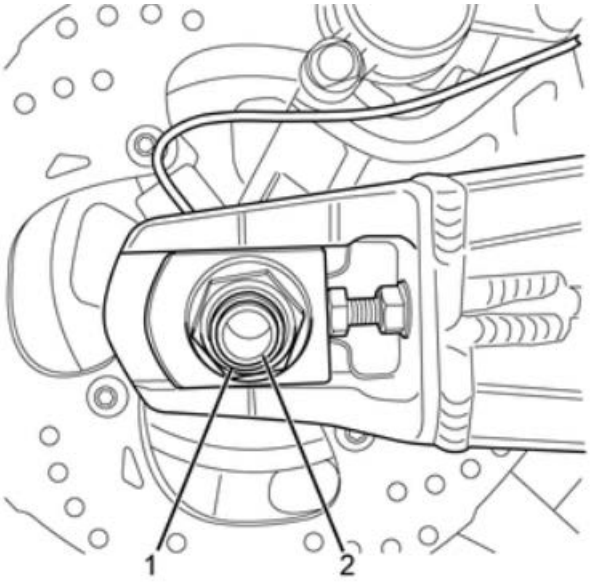


2. Install the brake rotor (2) onto the wheel flange; make sure that the countersunk portion of the brake rotor is facing out.
3. Apply Loctite® 242® to the threaded portion of the rotor bolts (1) and tighten into the flange.
   - Tighten rotor bolts to 9.5 lb-ft (13 Nm)

4. Install the rear wheel.
   a. Place the drive belt onto the wheel sprocket, ensuring that the left wheel spacer is in place.
   b. Position the wheel onto the motorcycle and ensure that the brake pads are on each side of the brake rotor.



   c. Position the ABS sensor between the wheel and the rear brake caliper housing. The anti-rotation tab (1) must be installed outside of the rear brake caliper housing.



   d. Slide the axle shaft (2) through the swingarm and wheel and install the nut (1).
   - Tighten axle shaft nut to 75 lb-ft (102 Nm)

5. Perform the brake pad bedding procedure. See Brake Bedding, page 45-11.

6. Road test the motorcycle. Refer to Road Testing Procedure, page 1-20.

ABS Module Replacement

Required Tools

- 3 mm hex wrench
- 4 mm hex wrench
- 5 mm hex wrench
- 14 mm wrench

Removal

⚠ CAUTION

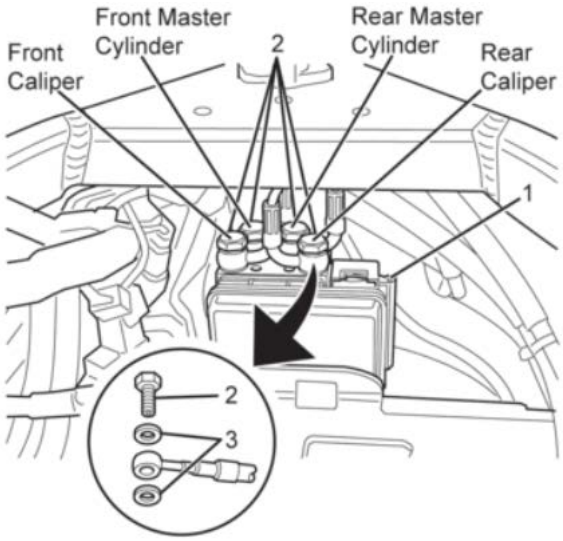
Mark the orientation and location of all hydraulic brake lines on the ABS Module (HCU) prior to removal. Failure to do so could result in incorrect ABS behavior, such as brake locking.

1. Remove the seat.
2. Remove the front fender.
3. Remove the tank assembly.
4. Remove the right and left chin fairing panels .
5. Remove the center fairing panel.
6. Move the turn signal flasher out of the way.

⚠ CAUTION

Refer to Brake Fluid Effects on Paint and Electrical Components Notice in General Information.

7. Place a suitable drain pan under the HCU.

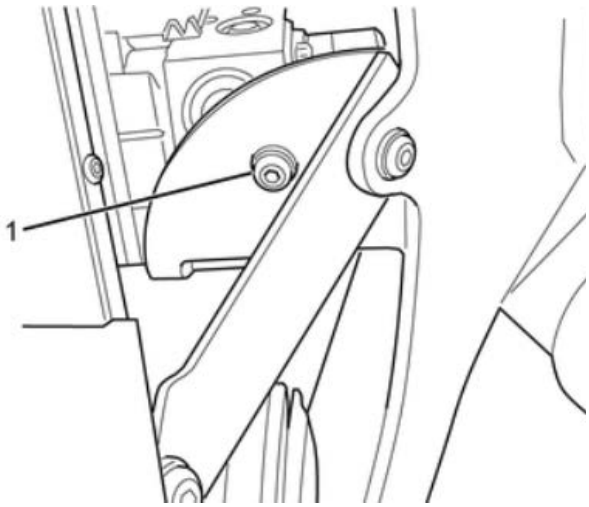


8. Disconnect the C428 module harness connector (1).

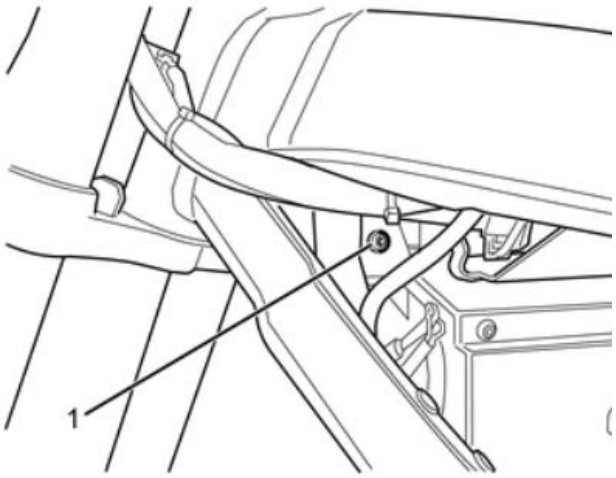
⚠ CAUTION

Mark the orientation and location of all hydraulic brake lines on the ABS Module (HCU) prior to removal. Failure to do so could result in incorrect ABS behavior, such as brake locking.

9. Remove all brake hose banjo bolts (2) and sealing washers (3) from the HCU.

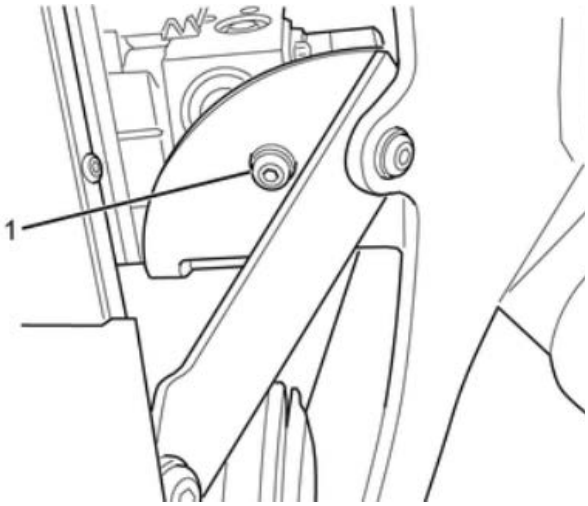


10. Remove the lower HCU bolt (1).

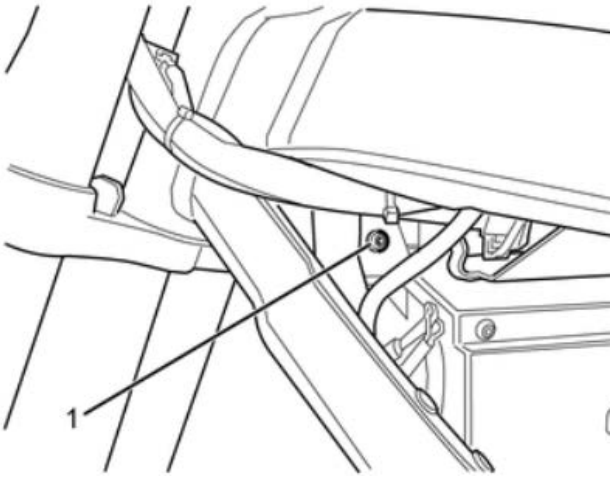


11. Remove the left side HCU bolt (1) and remove the HCU from the frame.

Installation



1. Install the HCU onto the frame and install the lower bolt (1).



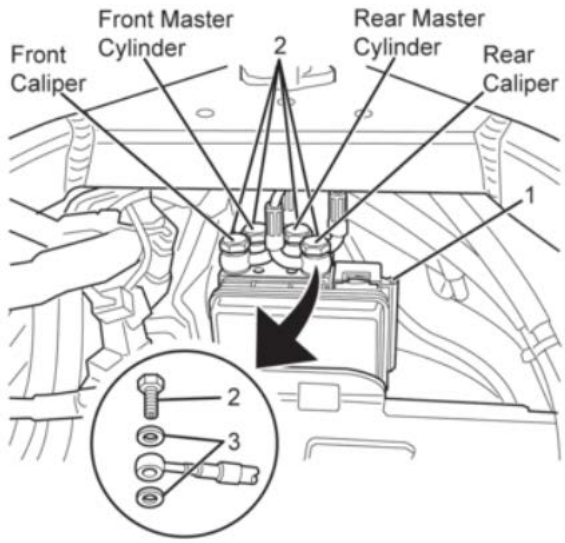
2. Install the left side bolt (1).
   - Tighten ABS HCU bolts to 6 lb-ft (8 Nm)

⚠ CAUTION

Correct orientation and location of all hydraulic brake lines on the ABS Module (HCU) is crucial. Failure to do so could result in incorrect ABS behavior, such as brake locking.

⚠ CAUTION

Always use new sealing washers on the banjo fittings.



3. Install the brake hoses to the module in the same orientation and location as removed with the banjo bolt (2) and new sealing washers (3).
   - Tighten banjo bolt 23 lb-ft (31 Nm)
4. Connect the C428 module harness connector (1) onto the HCU.
5. Install the center fairing panel.
6. Install the right and left chin fairing panels.
7. Move the turn signal flash back to its original location.
8. Install the tank assembly.
9. Install the seat.
10. Bleed the brake system.
11. Road test the motorcycle. Refer to Road Testing Procedure, page 1-20.

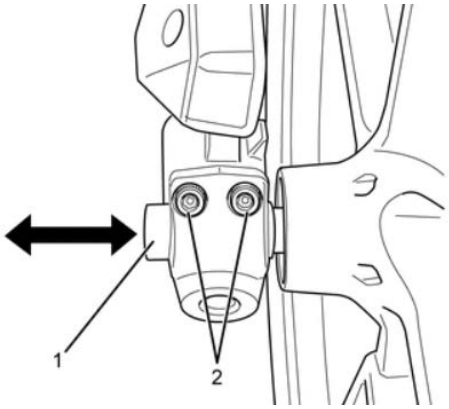
ABS Sensor Replacement-Front

Required Tools

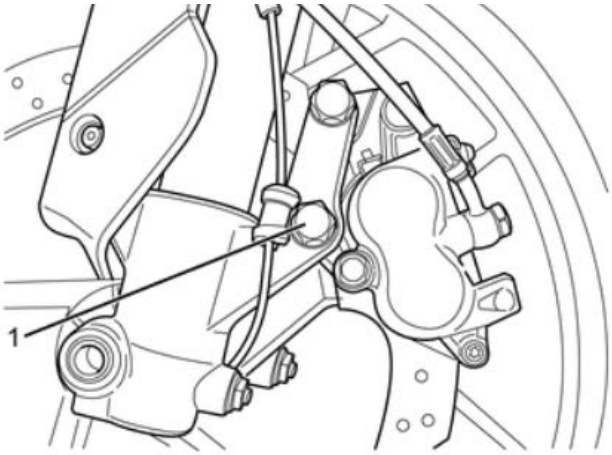
- 16 mm hex wrench
- 6 mm hex wrench
- 3 mm hex wrench

Removal

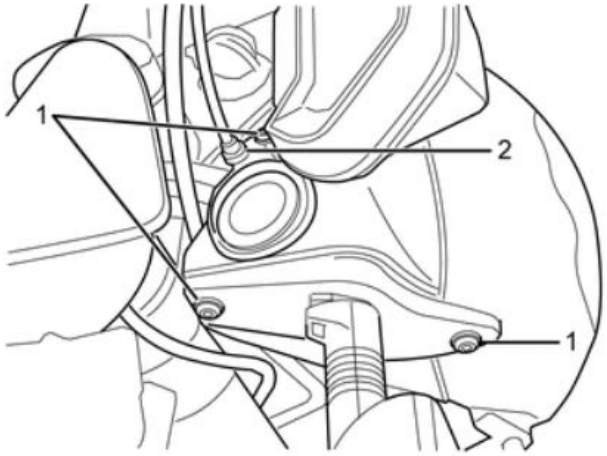
1. Remove the front wheel.
   a. Raise and support the motorcycle.



   b. Remove the front axle shaft pinch bolts (2) from the right lower fork leg.
   c. Unscrew the front axle (1) then slide the axle out of the fork.



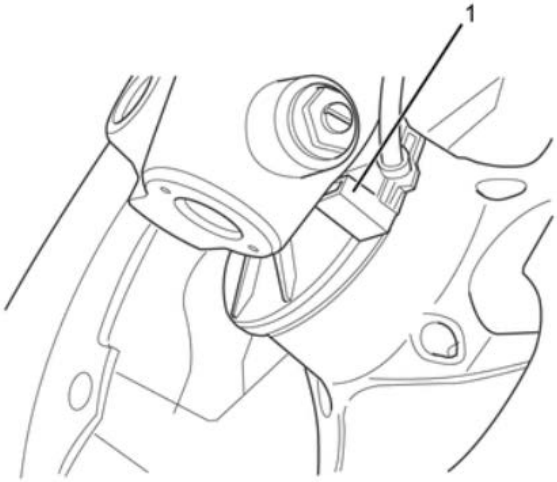
2. Remove the lower brake caliper bolt (1).
3. Remove the other two remaining harness clips from the fork.
4. Disconnect the C429 harness connector from behind the headlamp.



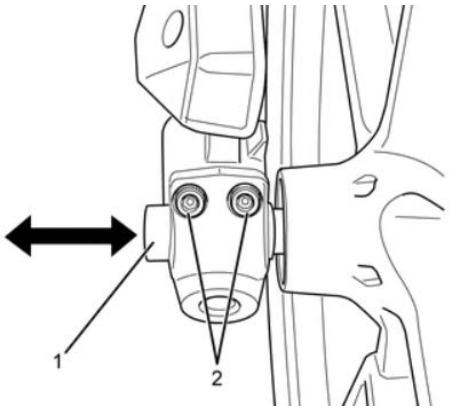
5. Remove the 3 right front turn signal bolts (1) and move the turn signal housing out enough to slide the ABS harness (2) from the turn signal housing area.
6. Remove the ABS sensor.

Installation

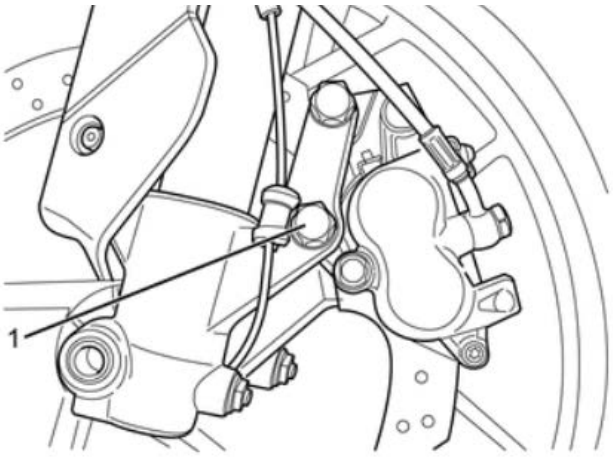
1. Install the front wheel.
   a. Position the wheel onto the motorcycle and ensure that the brake pads are on each side of the brake rotor.



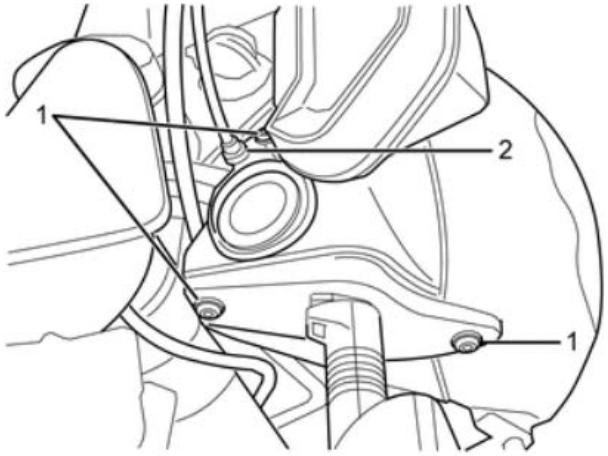
   b. Position the ABS sensor between the wheel and the left fork tube. The anti-rotation tab (1) must be installed as shown.



   c. Apply anti-seize (or equivalent) and slide the front axle shaft (1) through both fork legs and the wheel, making sure that the ABS sensor is in place, and tighten.
   - Tighten axle shaft to 40 lb-ft (54 Nm)
   - Tighten axle pinch bolts 9 lb-ft (12 Nm)



2. Position the ABS sensor harness clamp, and install the lower brake caliper bolt (1).
   - Tighten brake caliper bolt to 19 lb-ft (26 Nm)
3. Install the ABS sensor harness into the other two remaining harness clips on the fork.
4. Route the remaining portion of the harness in the same locations as remove and connect the C429 ABS harness connector.



5. Position the ABS sensor grommet (2) and move the turn signal housing into position and install the 3 bolts (1).
6. Road test the motorcycle. Refer to Road Testing Procedure, page 1-20.

ABS Sensor Replacement-Rear

Required Tools

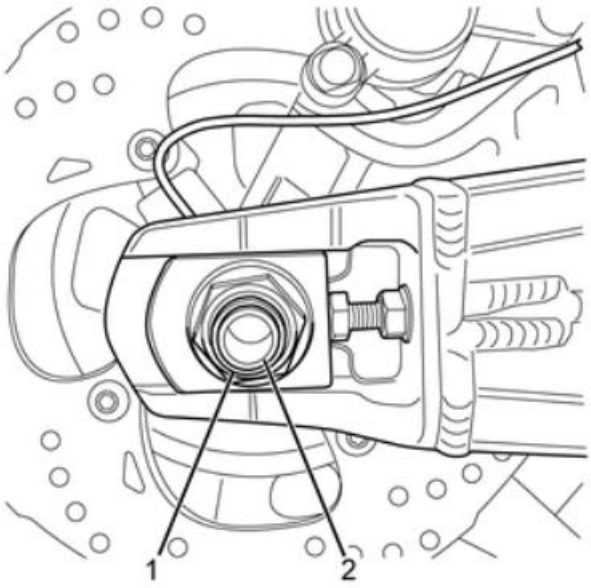
- 27 mm socket and socket wrench

Removal

1. Raise and safely support the motorcycle.

Note: The location of the swingarm ground strap and brake line clips, before removing the inner fender.

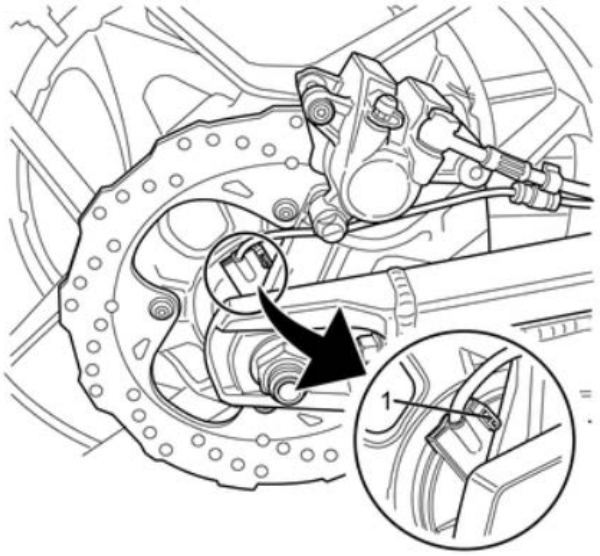
2. Remove the 4 bolts securing the rear fender to the swingarm, and remove the (rear inner fender, trimmed rear inner fender).



3. Remove the rear axle nut (1) and tap out the axle shaft (2). Note: Be aware of the axle shaft spacer on the left side of the wheel.
4. Lower the wheel, ensure that the brake caliper housing remains in place on the swingarm.
5. Follow the ABS sensor harness up to the C430 harness connector and disconnect.
6. Remove and harness ties or clips securing the harness on the motorcycle and remove the ABS sensor.

Installation

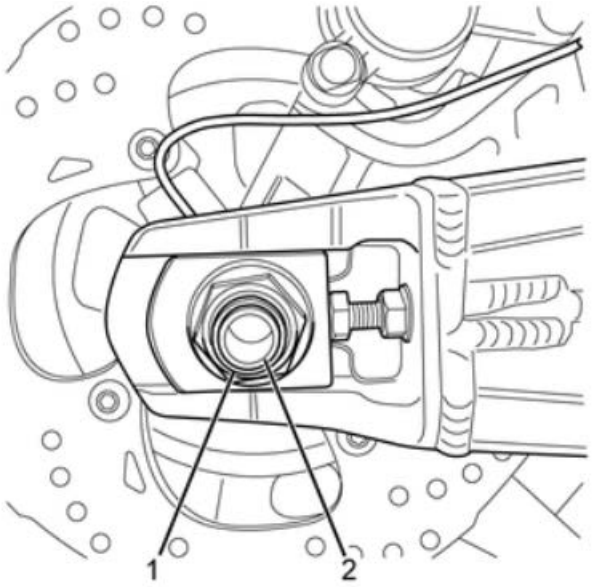
1. Ensure that the left wheel spacer is in place and move the wheel into position. Ensure that the brake rotor is centered between the brake pads.



2. Position the ABS sensor between the wheel and the rear brake caliper housing. The anti-rotation tab (1) must be installed outside of the rear brake caliper housing.

⚠ CAUTION

Placement of the anti-rotation tab (1) of the ABS sensor is critical, failure to install the anti-rotation pin in the correct location will cause sensor damage/failure. The anti-rotation tab must be installed outside of the rear brake caliper housing.



3. Slide the axle shaft (2) through the swingarm and wheel and install the nut (1).
   - Tighten axle shaft nut to 75 lb-ft (102 Nm)
4. Route the ABS sensor harness connector in the same locations as removed.
5. Connect the C430 ABS sensor harness connector.
6. Install the fender, ground strap and brake line clips onto the swingarm.
7. inspect the routing to ensure that the ABS sensor cable is not in contact with any moving parts.

Ignition Switch/Lock Cylinder Replacement

Required Tools

- Philips screwdriver
- 3 mm Hex wrench
- 4 mm Hex wrench
- 5 mm Hex wrench
- 10 mm hex wrench

Removal

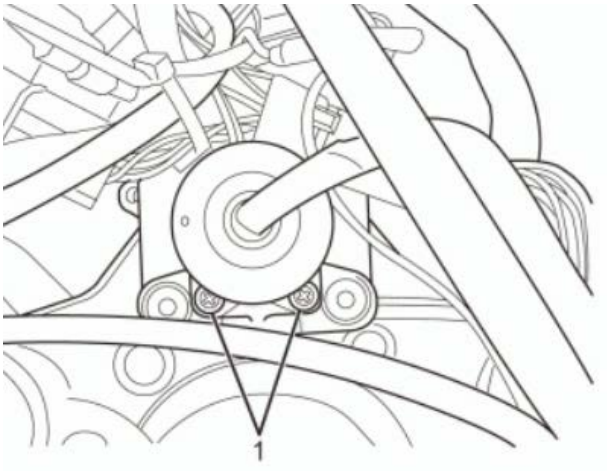
Note: The ignition switch and lock cylinder are replaced as a assembly.

Note: Duplicate keys can be made by using the 5-digit key code number. This number is located on a tag that accompanies the original keys.

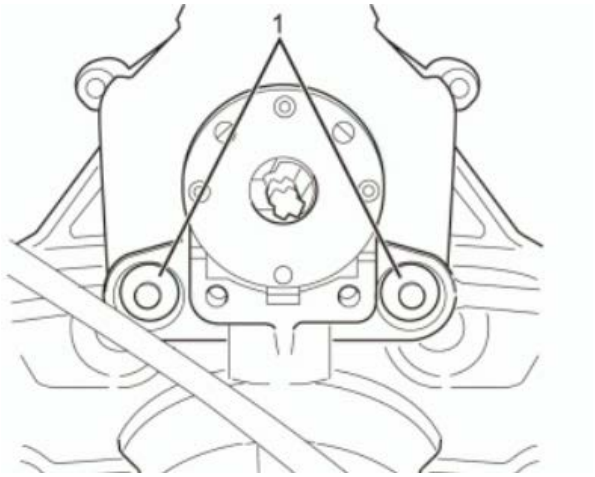
1. Remove the key from the key switch.

Remove the headlight assembly.

2. Remove the instrument panel and turn signal assembly.



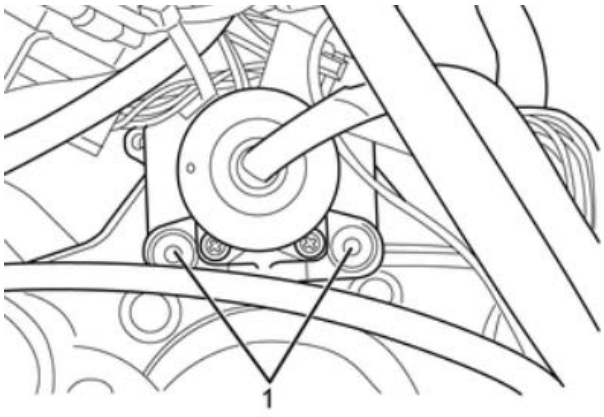
3. Remove the two screws (1) securing the ignition switch to the lock cylinder. This will provided additional clearance for removal of the break-away bolts.
4. Remove the seat.
5. Remove the front fender.
6. Remove the tank assembly.
7. Remove and discard any zip ties.
8. Disconnect the ignition switch connector C274 11 kW or C274.



9. Remove the breakaway bolts (1), and remove the lock cylinder. To remove the bolt you must use a bolt extractor. Follow the manufactures instructions for correct use of the bolt extractor.

Installation

1. Install Loctite® 271™ to the threads of the lock cylinder bolts.



2. Install the lock cylinder and bolts. Tighten the bolts until the nut head breaks off (1).
3. Connect the ignition switch connector.
4. Install new zip ties in the same location as removed.
5. Install the Instrument panel and turn signal assembly. Note: ensure that ground C239 is attached.
6. Install headlight assembly.
7. Install the tank assembly.
8. Install the front fender.
9. Install the seat.

Instrument Panel Replacement

Required Tools

- 3 mm hex wrench
- 10 mm wrench or socket
- Socket wrench

Removal

1. Remove the fly-screen.
2. Remove the right fairing panel.
3. Disconnect the instrument panel harness connector C282. Note the location of the zip ties for reassembly.
4. Remove and discard the zip ties.



5. Remove the 2 nuts (1) securing the instrument panel to the bracket, remove the instrument panel.

Installation



1. Install the 2 nuts (1) securing the instrument panel to the turn signal brackets.
   - Tighten to 3 lb-ft (4 Nm)
2. Connect the instrument panel harness connector C282.
3. Turn the handlebar fully right and install new zip ties in the same location as removed.
4. Install the fly-screen. Ensure that ground C238 is between the fly-screen bolt and the bracket.
   - Tighten to 2 lb-ft (3 Nm)
5. Install the right fairing panel.
   - Tighten to 2 lb-ft (3 Nm)

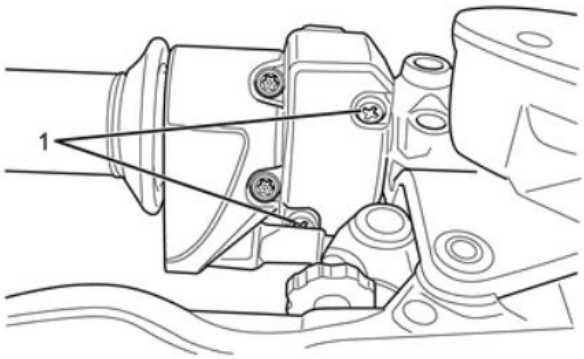
Right Handlebar Control Replacement

Required Tools

- Philips screwdriver
- 3 mm hex wrench
- 10 mm hex wrench

Removal

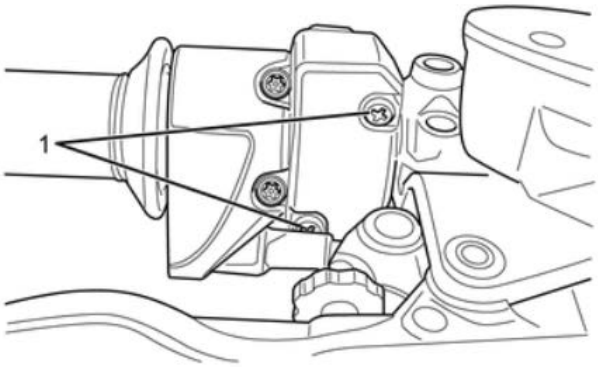
1. Remove the instrument panel and turn signal assembly.
2. Disconnect the right handlebar control harness connector C275. Note the location of the zip ties for reassembly.
3. Remove and discard the zip ties.



4. Remove the 2 Philips (1) from the right handlebar switch, and remove the switch.

Installation

1. Place the right handlebar control onto the handlebar aligning the switch pin with the hole in the handlebar.



2. Securely tighten the two screws (1). Do not over tighten.
3. Connect the right handlebar control harness connector C275.
4. Install new zip ties in the same location as removed.
5. Install the instrument panel and turn signal assembly. Note: Ensure that ground eyelet C239 is attached.

Headlight Bulb

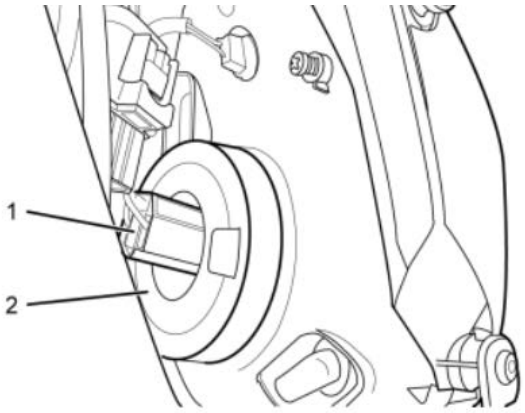
⚠ CAUTION

Caution: Halogen bulbs contain gas under pressure. Handling a bulb improperly could cause it to shatter into flying glass fragments. To help avoid personal injury:

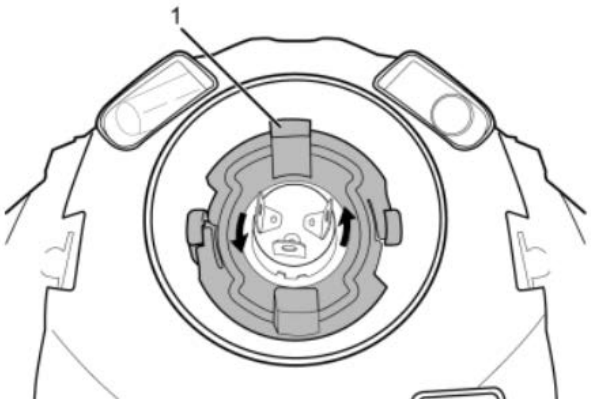
- *Turn off the key switch and allow the bulb to cool before changing the bulb.*
- *Leave the key switch OFF until the bulb change is complete.*
- *Always wear eye protection when changing a halogen bulb.*
- *Avoid touching the glass.*

Note: Use a H4 (55/60 watt) bulb for this replacement.

Removal



1. Working from behind the headlight, disconnect the headlight bulb connector (1) and remove the rubber cover (2).

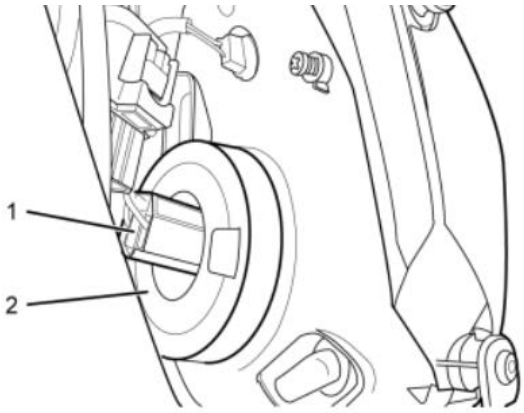


2. Remove the headlight bulb retainer (1) by turning it counter-clockwise.
3. Remove the headlight bulb by pulling it straight out.

⚠ WARNING

Do not touch the glass portion of the headlight bulb. Keep the headlight bulb free of contaminants. Oil from your fingers or contaminates will shorten the life of the bulb. Thoroughly clean any fingerprints or contaminates from the bulb using a clean cloth moistened with alcohol.

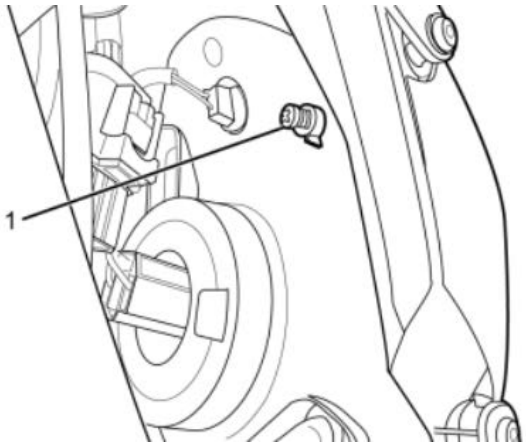
1. Install the headlight bulb into the lens.
2. Install the headlight bulb retainer and turn it clockwise until it locks into position.



3. Install the headlight bulb rubber cover (2).
4. Connect headlight bulb connector (1).

Headlight Alignment

The headlight should be checked for correct alignment periodically. It must be aligned any time the suspension sag is adjusted because this will affect the headlight alignment. Before the headlight can be aligned, the suspension sag and tire pressure must be correctly adjusted. The headlight can be adjusted vertically. If the vertical adjustment is off, it will cause the beam to point too close to or too far ahead of the motorcycle. With the headlight on the low beam position, the motorcycle perpendicular to the ground, and the operator sitting on the motorcycle, verify the beam alignment. The motorcycle is shipped with the headlight at a 0.5-2.5% dip.



The adjustment screw (1) is located on the back upper right corner of the headlamp. To adjust the headlight, turn screw until the correct beam alignment is achieved.

Turn Signal Flasher Replacement

Required Tools

- 3 mm hex wrench
- 5 mm hex wrench
- Philips screwdriver

The turn signal flasher is located at the front of the frame under the tank storage compartment.

Removal

1. Remove the seat.
2. Remove the tank assembly.
3. Disconnect the C42 turn signal flasher harness connector (1) and remove the flasher.
4. Remove and discard the zip tie, securing the flasher to the harness.

Installation

1. Connect the C42 turn signal flasher harness connector (1).
2. Install a new zip tie securing the flasher to the harness in the same location as removed.
3. Install the tank assembly.
4. Install the seat.